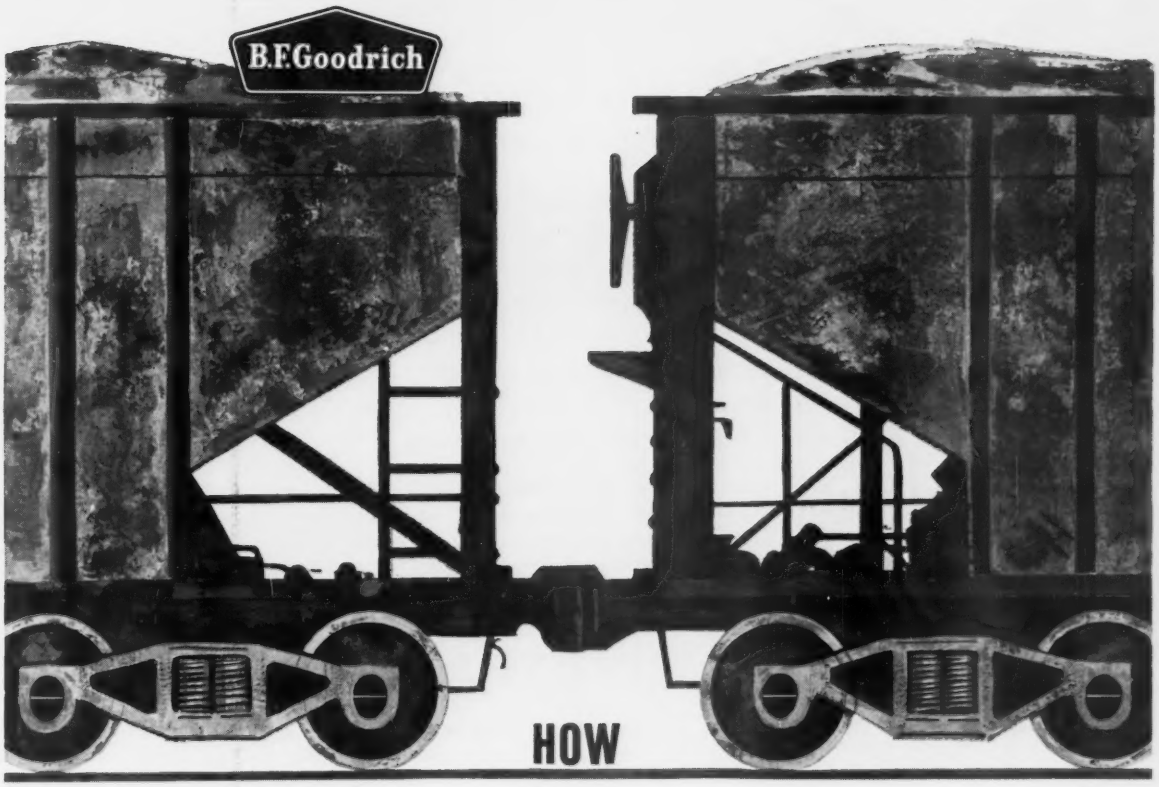
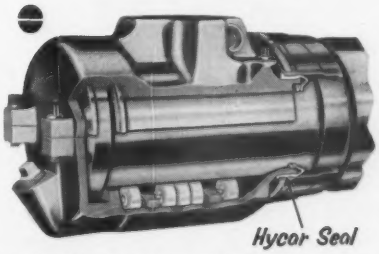


Clevite sealed sleeve cartridges using an oil seal of Hycar are manufactured by Cleveland Graphite Bronze division of Clevite Corporation, Cleveland, Ohio. B.F.Goodrich Chemical Company supplies the Hycar nitrile rubber for molding into seals.

HOW HYCAR PUTS A SEAL ON "HOT BOX" ELIMINATOR



Inspection of the working parts of this sealed sleeve bearing cartridge is necessary just once every nine years, according to the manufacturer. Beyond this, the only maintenance needed to assure against freight car "hot boxes" is an annual check of oil levels. Fitted against the journal inside the housing is a positive oil seal made of Hycar nitrile rubber which permanently retains the lubricant.

The manufacturer says, "Without question, there isn't a seal that compares with this one." He's referring to the outstanding resistance to abrasion, to oils and other hydrocarbons and to heat offered by Hycar. Years of service under these tough conditions won't affect the resilience or effectiveness of these seals. The properties of Hycar solve a tough molding problem, too.

Here's another example of how Hycar improves present products, sometimes makes possible entirely new products for new markets. Can Hycar help solve your problem? Write for information—Department MC-4, B.F.Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. In Canada: Kitchener, Ontario.

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Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

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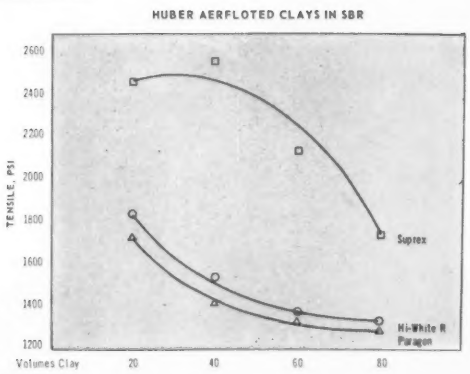
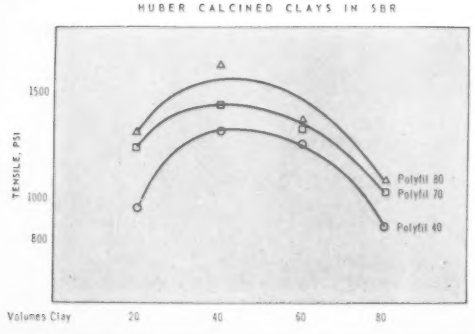
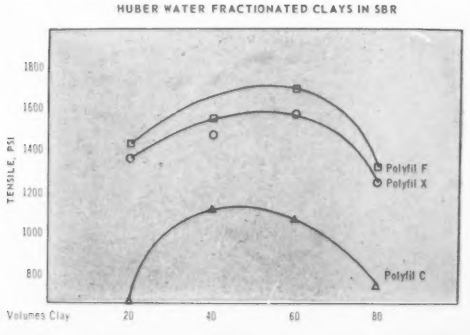


Calcined



Water Fractionated



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Highlights Sidelights *of the News . . .*

April, 1961

The Federal Trade Commission has ruled that separate contracts entered into by the Firestone Tire & Rubber Co. and the Goodyear Tire & Rubber Co. with the Atlantic Refining Co. and the Shell Oil Co. have "unlawfully injured competition in the distribution of tires, batteries and accessories at the manufacturing, wholesale and retail levels." . . . The FTC has ordered immediate cancellation of the contracts between the tire and oil companies (page 104).

Firestone Tire & Rubber Co. and the Dayco Corp. have reached an agreement for the purchase of Dayco's Tire Division by Firestone . . . The cash purchase price has not been disclosed . . . Firestone will acquire all the assets of the Tire Division including manufacturing facilities, equipment and furnishings, inventory and the "Dayton" brand name . . . The acquisition will be operated as a subsidiary of Firestone under the name of the Dayton Tire & Rubber Co. (page 105).

Manufacturers of tires, tubes and tread rubber have registered vigorous opposition to the excise tax increases which the new administration has asked Congress to levy on those products . . . The tax increases are said to be designed to provide additional revenue for the construction of Federal highways (page 108).

A program of sweeping economic goals aimed at security for rubber workers in an age of automation was unanimously approved by the United Rubber Workers Union at a meeting on March 15 and 16 in Cleveland, Ohio . . . The union voted to seek more supplemental unemployment benefits, a fund to aid workers laid off through technological change, and protection of skilled workers against the contracting out of work normally performed by them (page 111).

A $500,000 libel suit filed by Edward Lamb, a director of the Seiberling Rubber Co., against company president J. P. Seiberling has been dismissed in Common Pleas Court in Akron, Ohio . . . The presiding judge stated that the suit was "frivolous" and ordered that it be dismissed (page 112).

Firestone Tire & Rubber Co. has filed suit against the General Tire & Rubber Co. over the patent recently issued to General Tire on oil-extended rubber . . . The suit asks that the patent be declared void and invalid and the court recognize that Firestone and its customers now possess the right to use oil-extended rubber freely and without restriction throughout the world (page 104).

Directors of the Baldwin Rubber Co., Pontiac, Mich., Montrose Chemical Co., Newark, N. J., and the Centlivre Brewing Corp., Wayne, Ind., have approved a proposed merger of the three firms . . . The surviving company will be known as the Baldwin-Montrose Chemical Co. (page 113).

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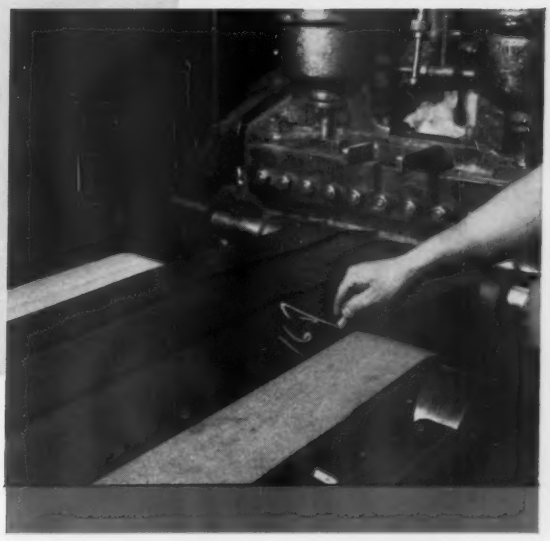

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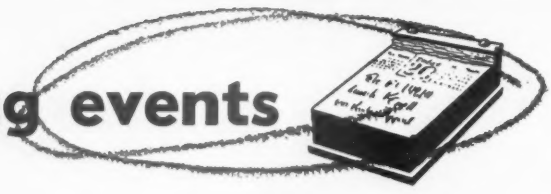

April 19-21. Division of Rubber Chemistry, American Chemical Society, Spring Meeting, Brown Hotel, Louisville, Ky.

April 19. Quebec Rubber & Plastics Group, Technical Meeting, Queen's Hotel, Montreal, Quebec, Canada.

April 19. Washington Rubber Group, Ladies Night, Washington, D. C.

April 21. Detroit Rubber & Plastics Group, Spring Meeting, Wolverine Hotel, Detroit, Michigan.

April 27-28. Electric Wire & Cable Section, Wire Association, Regional Meeting, Sheraton-Atlantic Hotel, New York, N. Y.

April 28. Chicago Rubber Group, Technical Meeting, Furniture Club, Chicago, Ill.

April 28. Philadelphia Rubber Group, Technical Meeting, Poor Richard Club, Philadelphia, Penna.

May 2. Los Angeles Rubber Group, Technical Meeting, Biltmore Hotel, Los Angeles, Calif.

May 12. Buffalo Rubber Group-Ontario Rubber Group, Joint Meeting, Sheraton Brock Hotel, Niagara Falls, Ontario, Canada.

May 16. Elastomer & Plastics Group, Northeastern Section, American Chemical Society, Annual Short Talks Meeting, Morse Auditorium, Boston, Mass.

May 17. Washington Rubber Group, Annual Meeting, Pepco Auditorium, Washington, D. C.

May 19. Connecticut Rubber Group, Technical Meeting.

June 1. New York Rubber Group, Summer Outing, Old Cedar Mill Grove, Union, N. J.

June 2. Quebec Rubber & Plastics Group, Golf Outing, St. Hyacinthe, Quebec, Canada.

June 3. Southern Ohio Rubber Group, Summer Outing.

June 8. Rhode Island Rubber Club, Summer Outing, Pawtucket Country Club, Pawtucket, R. I.

June 9. Fort Wayne Rubber & Plastics Group, Summer Outing, Tippecanoe Lake Country Club, Ft. Wayne, Ind.

June 9-11. Los Angeles Rubber Group, Summer Outing, Stardust Hotel, Las Vegas, Nev.

June 13. Buffalo Rubber Group, Summer Outing, Lancaster Country Club, Buffalo, N. Y.

June 16. Akron Rubber Group, Summer Outing, Firestone Country Club, Akron, Ohio.

June 16. Boston Rubber Group, Summer Outing, Andover Country Club, Andover, Mass.

June 23. Detroit Rubber & Plastics Group, Summer Meeting, Western Country Club, Detroit, Mich.

June 23. Washington Rubber Group, Annual Outing, Brooke Manor Country Club, Washington, D. C.

June 23-24. Southern Rubber Group, Buena Vista Hotel, Biloxi, Miss.

June 25-30. ASTM Annual Meeting, Chalfonte-Hall, Atlantic City, N. J.

June 27-30. Committee D-11 on Rubber and Rubber-Like Materials, ASTM, Annual Meeting, Chalfonte-Haddon Hall, Atlantic City, N. J.

July 3-7. Gordon Research Conferences, Polymers, Colby Junior College, New London, N. H.

July 17-21. Gordon Research Conferences, Elastomers, Colby Junior College, New London, N. H.

July 27-Aug. 1. International Symposium on Macromolecular Chemistry, Co-sponsored by the ACS Division of Polymer Chemistry and the IUPAC Commission on Macromolecules, Queen Elizabeth Hotel, Montreal, Quebec, Canada.

August 4. Rubber Chemistry Division, Chemical Institute of Canada, Technical Meeting, Queen Elizabeth Hotel, Montreal, Quebec, Canada.

August 10. New York Rubber Group, Golf Outing, Scotch Plains and Echo Lake Country Clubs, Scotch Plains and Westfield, N. J.

Aug. 18. Philadelphia Rubber Group, Golf Outing, Manufacturers Country Club, Oreland, Penna.

Aug. 28-Sept. 1. Gordon Research Conferences, Adhesion, New Hampton School, New Hampton, N. H.

Sept. 3-8. American Chemical Society, 140th National Meeting, Chicago, Ill.

Sept. 5. Los Angeles Rubber Group, Technical Meeting, Biltmore Hotel, Los Angeles, Calif.

Sept. 5-8. Division of Rubber Chemistry, American Chemical Society, Sherman Hotel, Chicago, Ill.

Sept. 9. Connecticut Rubber Group, Annual Outing.

Sept. 21. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

Sept. 28. Southern Ohio Rubber Group, Fall Technical Meeting.

Oct. 3. Los Angeles Rubber Group, Technical Meeting, Biltmore Hotel, Los Angeles, Calif.

Oct. 5. Detroit Rubber & Plastics Group, Fall Meeting, Wolverine Hotel, Detroit, Mich.

Oct. 10. Buffalo Rubber Group, Fall Meeting, Hotel Westbrook, Buffalo, N. Y.

Oct. 10-12. American Standards Association, 12th National Conference on Standards, Rice Hotel, Houston, Texas.

Oct. 13. Boston Rubber Group, Fall Meeting, Somerset Hotel, Boston, Mass.

Oct. 16-20. National Safety Council, 49th Annual Convention, Chicago, Ill.

Oct. 20. Akron Rubber Group, Technical Meeting, Sheraton Hotel, Akron, Ohio.

Oct. 20. Joint Meeting of New York, Connecticut and Philadelphia Rubber Groups, Henry Hudson Hotel, New York, N. Y.

Nov. 2. Rhode Island Rubber Club, Fall Meeting, Pawtucket Country Club, Pawtucket, R. I.

Nov. 3. Philadelphia Rubber Group, Fall Dance, Manufacturers Country Club, Oreland, Penna.

Nov. 7. Los Angeles Rubber Group, Technical Meeting, Biltmore Hotel, Los Angeles, Calif.

Nov. 17. Connecticut Rubber Group, Technical Meeting.

Nov. 26-Dec. 1. American Society of Mechanical Engineers, Winter Annual Meeting, Statler Hilton Hotel, New York, N. Y.

Dec. 1. Tenth Annual Wire & Cable Symposium, Berkeley-Carteret Hotel, Asbury Park, N. J.

Dec. 7. Fort Wayne Rubber & Plastics Group, Van Orman Hotel, Fort Wayne, Ind.

Dec. 8. Detroit Rubber & Plastics Group, Christmas Party, Statler Hilton Hotel, Detroit, Mich.

Dec. 8. Los Angeles Rubber Group, Christmas Party, Beverly Hilton Hotel, Beverly Hills, Calif.

Dec. 9. Southern Ohio Rubber Group, Christmas Party.

Dec. 12. Buffalo Rubber Group, Christmas Party, Buffalo Trap and Field Club, Buffalo, N. Y.

Dec. 15. Boston Rubber Group, Christmas Party, Somerset Hotel, Boston, Mass.

Dec. 15. New York Rubber Group, Christmas Party, Henry Hudson Hotel, New York, N. Y.

Jan. 26, 1962. Akron Rubber Group, Technical Meeting, Sheraton Hotel, Akron, Ohio.

April 24-27, 1962. Division of Rubber Chemistry, American Chemical Society, Hotel Statler, Boston, Mass.

May 22-25, 1962. Institution of the Rubber Industry, 4th International Rubber Technology Conference, Church House, Westminster, London, England.

Oct. 16-19, 1962. Division of Rubber Chemistry, American Chemical Society, Hotel Cleveland, Cleveland, Ohio.

May 7-10, 1963. Division of Rubber Chemistry, American Chemical Society, Royal York Hotel, Toronto, Ontario, Canada.

Sept. 10-13, 1963. Division of Rubber Chemistry, American Chemical Society, Hotel Commodore, New York, N. Y.

April 28-May 1, 1964. Division of Rubber Chemistry, American Chemical Society, Sheraton-Cadillac Hotel, Detroit, Mich.

Sept. 1-4, 1964. Division of Rubber Chemistry, American Chemical Society, Sherman Hotel, Chicago, Ill.

Spring 1965. Division of Rubber Chemistry, American Chemical Society, Miami Beach, Fla.

Oct. 19-22, 1965. Division of Rubber Chemistry, American Chemical Society Bellevue-Stratford Hotel, Philadelphia, Penna.

May 3-6, 1966. Division of Rubber Chemistry, American Chemical Society, Fairmount Hotel, San Francisco, Calif.

May 2-5, 1967. Division of Rubber Chemistry, American Chemical Society, Queen Elizabeth Hotel, Montreal, Quebec, Canada.

Sept. 12-15, 1967. Division of Rubber Chemistry, American Chemical Society, Sherman Hotel, Chicago, Ill.

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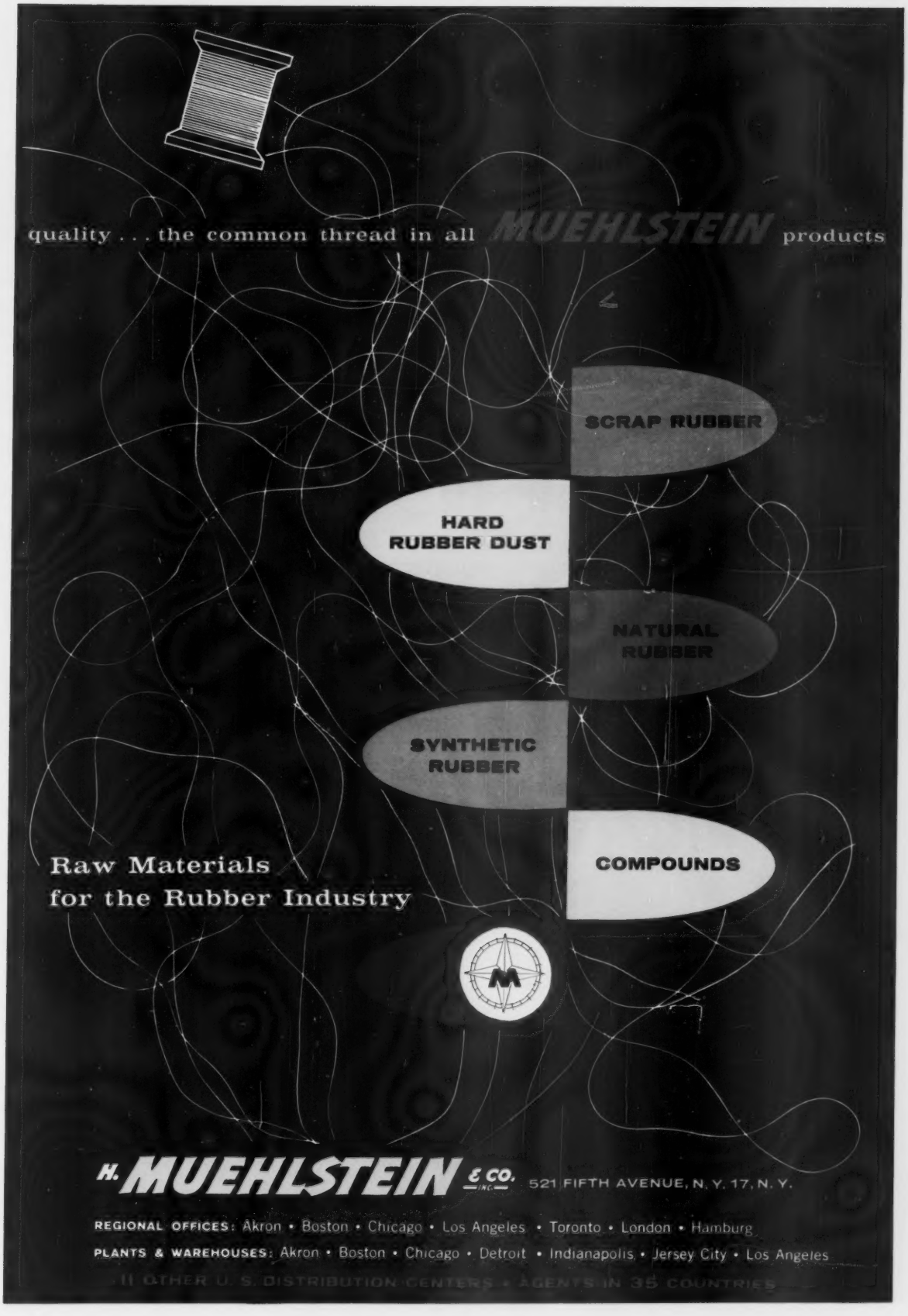
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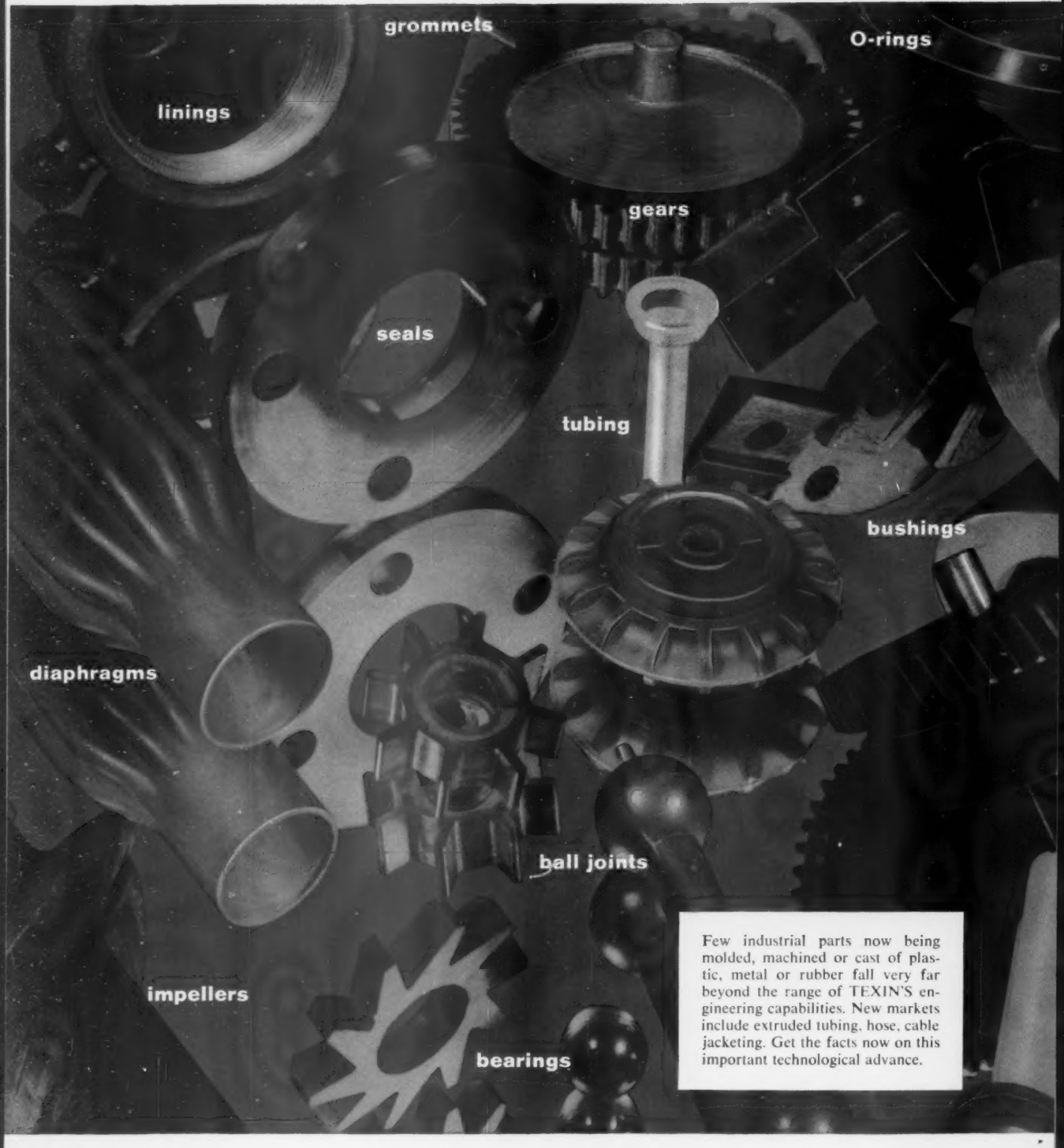

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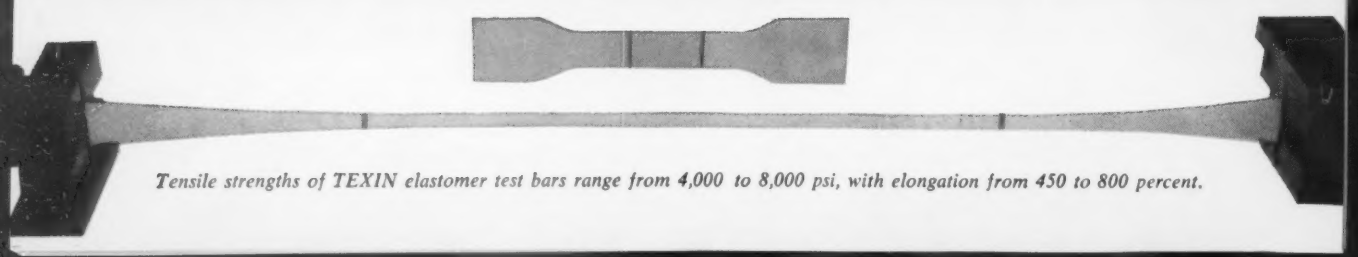

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MOBAY

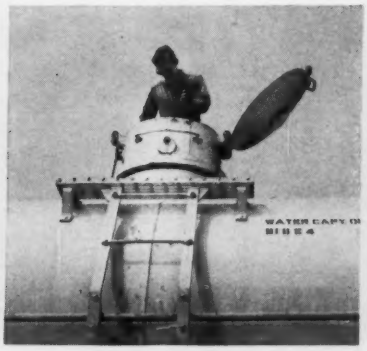
e-7

MEET BILLY RENEAU – United Carbon district sales manager and an avid fisherman when not working.

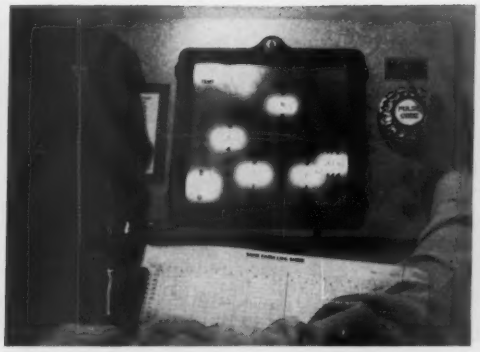
In fishing, selecting the right bass plug is the first step in bringing in the big ones.

In our business, selecting the best raw materials is the first step in producing better black masterbatches.

THE FIRST STEP



United Carbon samples for quality testing during every phase of black masterbatch production. Here, a technician is sampling a tank car of monomer prior to approving its use.



Dialing from a central control point helps this United Carbon technician obtain necessary data to maintain quality of the monomers used in producing black masterbatches. Highly instrumented controls, such as those shown, aid in efficiently producing top-flight masterbatch products.

Carbon black, styrene and butadiene are only three of the raw materials used to produce BAYTOWN black masterbatches. However, United Carbon takes every step necessary to, first, make sure each ingredient is of the highest quality and, second, to keep it at these high standards through all production steps.

As these raw materials are received, each is tested to make certain of its high caliber before and during storage as well as just before production starts. Then, as the ingredients are combined, quality control tests are made all along the line to assure production of black masterbatches with uniformity unsurpassed in the industry.

BAYTOWN—The Birthplace of Black Masterbatch

For more information on the quality and uniformity of Baytown black masterbatch, contact:

UNITED CARBON COMPANY, INC.
410 PARK AVENUE, NEW YORK 22, N. Y.
A Subsidiary of United Carbon Company

AKRON CHICAGO LOS ANGELES
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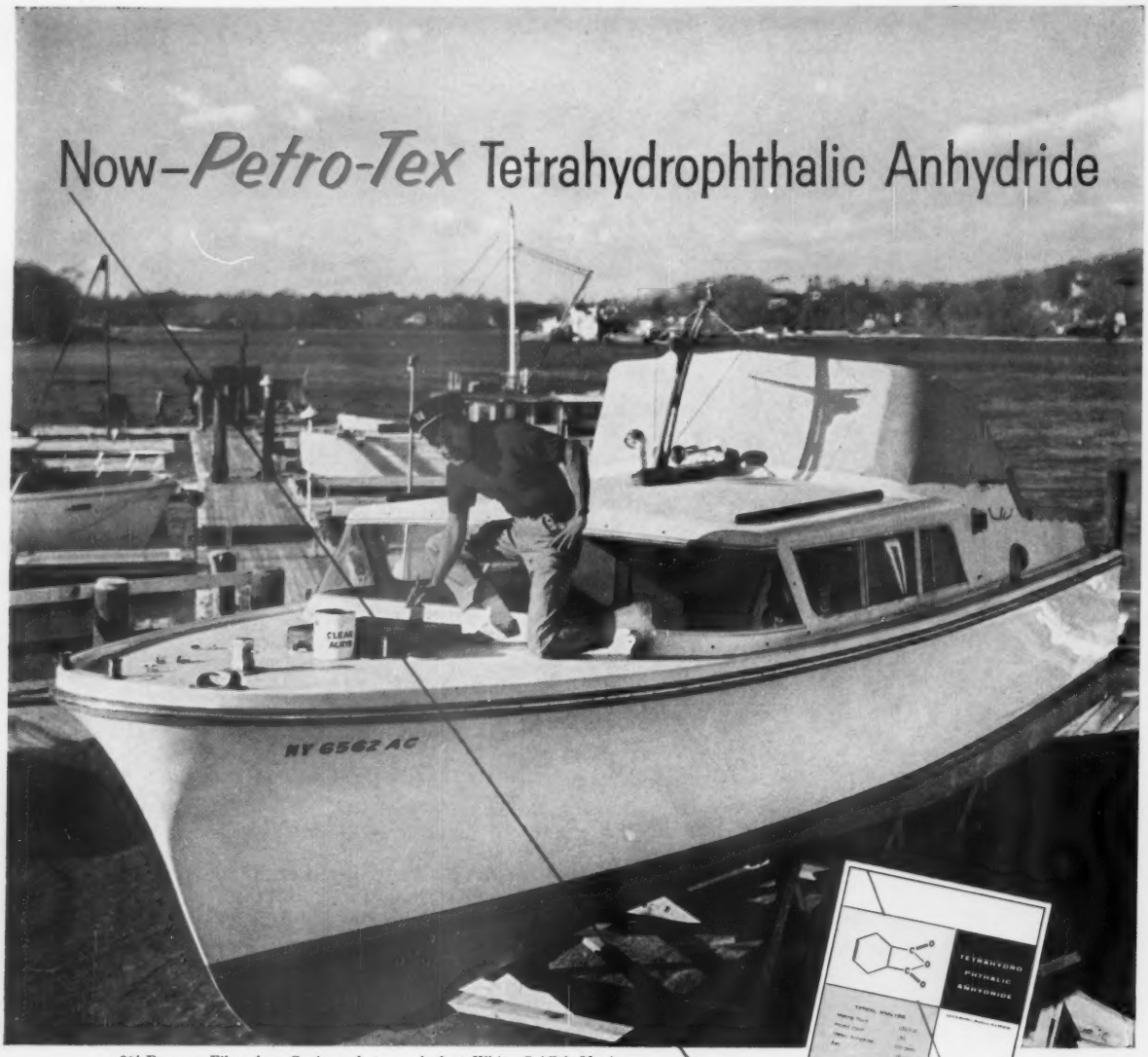
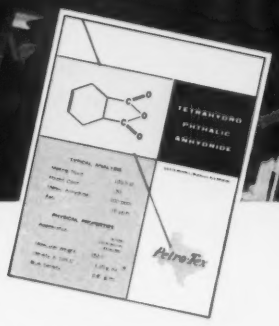
In France: UNITED CARBON FRANCE. S.A.

UNITED CARBON

Now–*Petro-Tex* Tetrahydrophthalic Anhydride



30′ Pearson Fiberglass Cruiser photographed at White Griffith Marine



Have *you* tried this interesting anhydride in *your* polyester, alkyd or plasticizer formulations?

Petro-Tex can currently supply car-load quantities of Tetrahydrophthalic Anhydride in 250# fiber drums.

With major capacity to produce Maleic Anhydride and Butadiene, Petro-Tex will have captive supplies of the two starting components for Tetrahydrophthalic Anhydride.

Write for your copy of our technical data brochure on Petro-Tex Tetrahydrophthalic Anhydride.

Inquiries are also invited on:

BUTADIENE	**n-BUTENE-1**	**DIISOBUTYLENE**
ISOBUTYLENE	**n-BUTENE-2**	**TRIISOBUTYLENE**

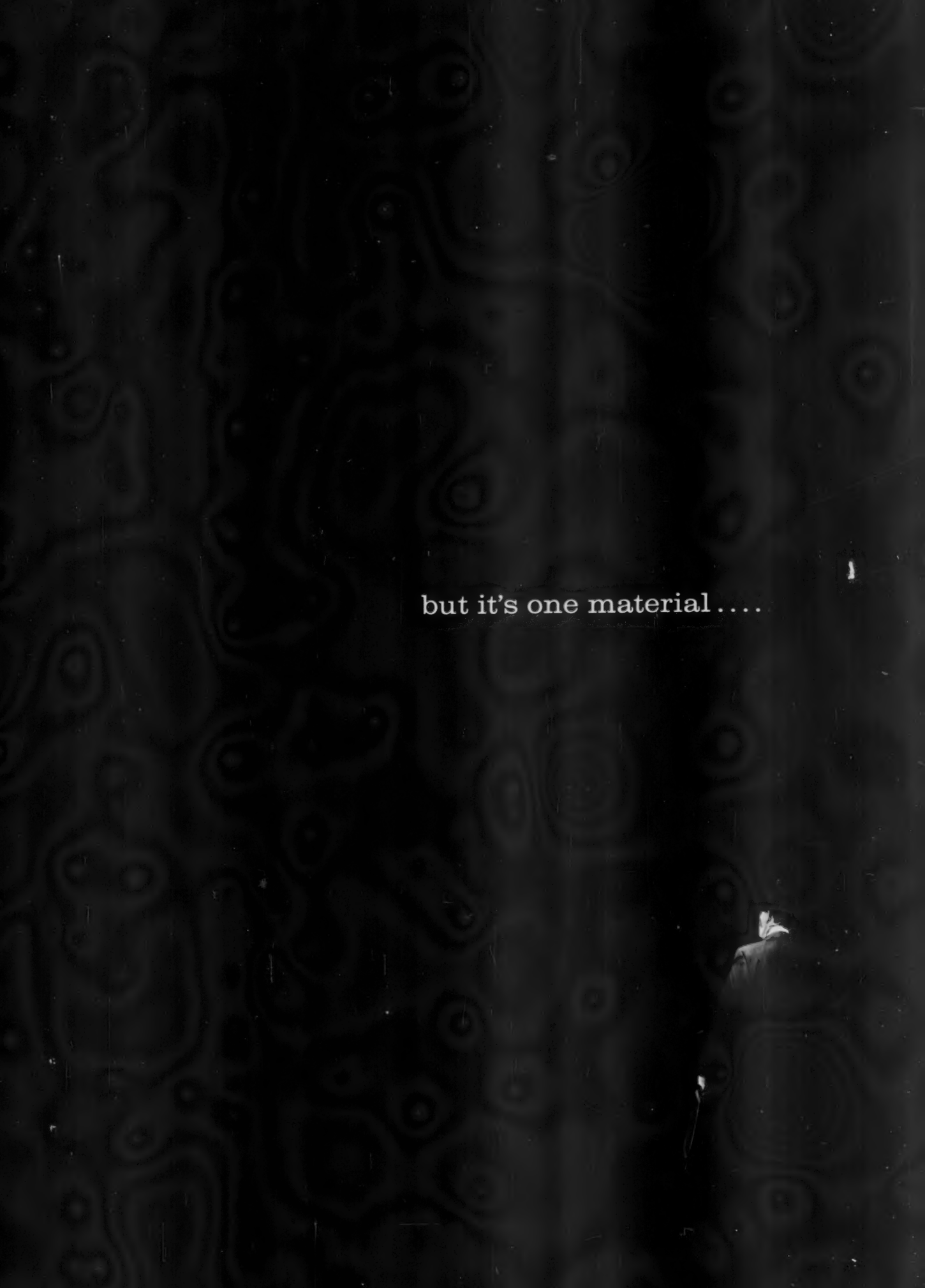
Petro-Tex®

PETRO-TEX CHEMICAL CORPORATION

8600 PARK PLACE, HOUSTON 17, TEXAS

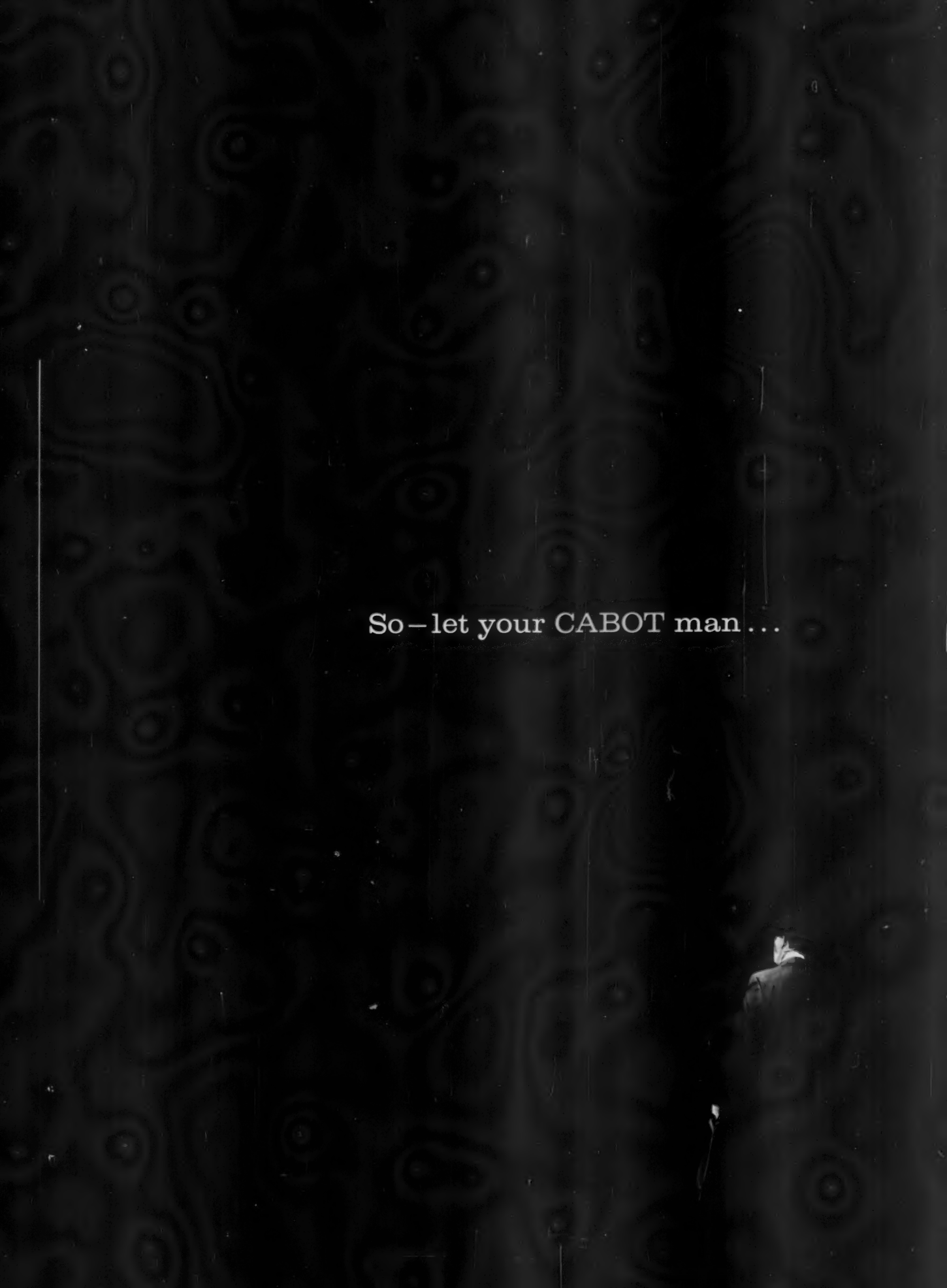
There is nothing so black . . . .

. . . as Carbon Black


but it's one material....

... you DON'T want to buy in the dark

So – let your CABOT man . . .



Lighten your problems....

Your Cabot man offers the widest range of blacks in the wide, wide world, including REGAL®, Cabot's new oil furnace blacks; SPHERON® channel blacks; STERLING® furnace and thermal blacks; and VULCAN® oil furnace blacks. ■ He knows how to save you money. He can help you take advantage of mixed carload and truckload savings. He can usually save you time on deliveries. And, often, he can help you sidestep currency exchange problems, simplify purchasing and reduce costs. ■ That's because your Cabot man is backed by the world's most extensive production and service facilities, uniquely geared to make your carbon black rubber compounding problems **no problems at all** — a simple matter, in fact, of picking up your phone and dialing Cabot.

CABOT CORPORATION

REGAL:
Regal* 600
Regal 300
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FURNACE:
Vulcan* 9 SAF
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Vulcan 3 HAF
Vulcan XC-72 ECF
Vulcan SC SCF
Vulcan C CF
Sterling* 99 FF
Sterling SO FEF
Sterling V GPF
Sterling L HMF
Sterling LL HMF
Sterling S SRF
Sterling NS SRF
Pelletex* SRF
Pelletex NS SRF
Sterling R SRF
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AUSTRALIA — Australian Carbon Black Pty. Limited, Millers Road, Altona, Victoria (jointly owned)

Printed in U.S.A. April, 1961

• **Soviet Enlarging Chemical Industry in East Germany.** A short time ago, the Soviet Council for Mutual Economic Assistance, called Comecon, met in East Berlin. The communique covering the 14th session of this body indicated that Soviet Russia plans to enlarge East German chemical industries. Quite a number of chemical factories located in East Germany, known all over the world before World War II, have received considerable quantities of equipment and machinery based upon long-term credits extended by the Soviet Union. In turn, East Germany is obligated to deliver all kinds of chemical raw materials and products to the other satellite countries. Scientists and scientific accomplishments are being exchanged between the satellites, and chemists from the other satellite countries receive training in the technical colleges in East Germany.

The big Russian pipeline bringing crude oil from the East will be connected via Poland with a factory near Frankfurt on the Oder. There, in a little town called Schwedt, a huge petro-chemical combine is in the process of being built. By 1963, the first Soviet crude oil will fill the tanks of the new refinery. By the end of the seven-year plan in 1965, the refinery in Schwedt will produce gasoline, all kinds of petroleum derivatives, crude oil, and raw materials for high molecular specialties.

In different sections of the zone, new factories are being built or existing ones enlarged. The nationalized chemical works, Friedrich Engels, in Premnitz on the Havel, is going to be one of the largest chemical factories of Europe. In Coswig in Saxony and in Bitterfeld near Halle, huge combines are being constructed. Synthetic rubber will be produced on a large scale in the Buna Werke in Schkopau near Merseburg.

However, a number of difficulties have cropped up. It is practically impossible to obtain additional labor. The plan limits the chemical industry to 250,000 workers; until 1965, the number of employees in the chemical industry can only be raised by 5 per cent. In view of the fact that the planned production is supposed to be filled up to 70 per cent by the existing factories, there is only one way to make progress, and that is to introduce more economical and automated working methods. However, progress is visible already and within a few years it will be possible to judge whether the chemical industry of East Germany has been able to reach the planned goal.

• **Determining Moisture Content of Tire Cord.** A new dielectric method for quick determination of the moisture content of tire cord is described in a feature article in *Kautschuk und Gummi*. The article deals with the structural features of a new type of device for determining the moisture content of individual fibers of rayon tire cord and details of the simple and quick method of operation which are fully described.

Since the dielectric conductivity forming the basis of the measuring process normally depends on two different magnitudes, the water content and the mass, the authors show how by means of a double measurement and quotient formation by condensers of differing construction, the mass is eliminated and a consistent relationship between water content and measurement value established.

The accuracy of measurement with the new electric method is investigated and compared to the conventional conditioning process, with the result that the statistical evaluation speaks for the new method. Moreover, the test time is in favor of this method with a ratio of almost 100 to 1.

The effects of rubber compound residues, preparation, type of cord, cord thickness and cord construction are discussed. Finally, by means of suitable illustrations and control cards, details are given on applications and uses in industry, and suggestions are given for a more intensive and at the same time simpler technique.

• **Soviet Cars Sold in England.** In the course of the English-Soviet Commercial Treaty, an exchange of cars amounting to a total of $450,000 has been arranged. The new Soviet automobile *Zaporojetz Communar* will be on the English market in the latter part of Spring. This car is being manufactured in large volume in the "Communar" factory in Zaporojetz in the Ukraine. Mr. Khrushchev has taken the first test ride with this car, which is a Soviet replica of the West German B.M.W. and the Italian Fiat; however, the Soviets claim that their car is far superior and holds the road much better.

The car uses approximately one gallon of gas for fifty miles and has a cruising speed of 50 miles per hour. The motor is air-cooled, the car is heated electrically, and there is a special tank with a capacity for 300 miles. The *Zaporojetz* has a gear box with 5 speeds. It is equipped with radio. At present, two Soviet cars can be bought in England, the

Moskvich which retails at $2280, and a larger car, the *Volga,* which is sold for $3340.

In spite of the fact that the cars have been on the market since last March, only about 30 of them have been sold up to now.

• **Rebound Study on Alpha-Olefin Polymers and Copolymers.** A rebound study on alpha-olefin polymers and copolymers has been published by our French contemporary, *Revue Générale du Caoutchouc.* The authors state that of all synthetic elastomers developed during the past few years, thanks to the progress of processes of anionic polymerizing with co-ordination, ethylene-alpha-olefin copolymers are causing the highest interest. These products can be easily manufactured from low-cost monomers, and are characterized by a good resistance to aging and chemicals, light weight, and good mechanical and dynamic properties which are useful for the most varied applications. The results of measurements carried out in the field of dynamic properties are given.

• **German Tire Cartel Litigation Goes Before Regular Court.** In recent issues, we reported on the resistance of the German cartel authority to approving a tire cartel. The case has been turned over to the regular court which, according to latest information, will send a questionnaire to all ten tire manufacturers in Germany, requesting the respective production figures for the various dimensions. By comparing the import quantities of the various tire sizes, it might be possible to check whether or not the claimed competition which is ostensibly caused by the importation of tires really exists. Furthermore, it will be ascertained whether or not the recapping of tires constitutes true competition for the manufacturers of new tires. The results of these inquiries will be available to the court within four to six weeks. Based upon the answers, the court will proceed with the case.

• **Dunlop Developing Plantation in Eastern Nigeria.** Dunlop Nigerian Plantations, Ltd., a subsidiary of the British Dunlop Rubber Co., Ltd., contemplates investing about one million dollars in new rubber plantations in the vicinity of Calabas in Eastern Nigeria. At the present time, the company is negotiating with the Government of East Nigeria to buy a sufficient amount of land, consisting of about 40,000 acres, in order to employ approximately 5000 Nigerian laborers. It is expected that the plantation will yield approximately 10,000 tons of latex annually which, after due processing, will be exported as long as the newly planned factory for the production of automobile tires will not be operating.

• **Keen Competition in Eastern Nigeria.** The Nigerian Government seems to be very eager to have her own tire factory. It is for this reason that the Minister of Economics of the Nigerian Government, Mr. J. U. Nwodo, has just signed an agreement with the Michelin Tire Company, Ltd., covering the construction and operation of a tire factory which will require an investment of approximately 12 million dollars. Michelin and the Government will join forces to organize a company for the purpose of putting the largest factory of this kind in Nigeria on stream. The factory will manufacture Michelin tires which are well-known already in Nigeria. Part of the production will be used for export.

• **Poland Building a Third Tire Factory.** Because of the fact that the Stomil factory in Poznan and the Degum factory in Debica are unable to satisfy the ever-growing demand for tires, the Polish Government has decided to build a new factory near Olsztyn. Approximately 3,000 people will be employed, and the annual capacity will amount to 3.5 million tires for cars and tractors. A better quality of tires than manufactured heretofore in the two existing factories will be produced. The major part of the machinery, equipment and the new design will be delivered by a number of British companies. Construction will start by the end of 1962.

• **Huels Increases Production.** Bunawerke Huels GmbH increased its 1960 production of synthetic rubber by 67 per cent and reached a volume of 70,000 tons. The annual output in 1959 amounted to 41,722 tons. In 1960, approximately 13 per cent of its synthetic rubber production had been exported. The capacity of the factory has been enlarged and is rated, at the present time, at 120,000 tons a year. At the end of 1960, a carbon black rubber factory having a monthly capacity of 300 tons, went on stream.

• **Tire Factory in Angola.** The Overseas Ministry in Lisbon (Portugal) announced that a tire factory will be constructed in Angola. The new facility will be built in Cacuaca, about 12 miles from Luanda. Sixty per cent of the capital of the new company will be held by Portuguese individuals.

• **German Company To Produce Airplane Tires.** Tires for airplanes are again being manufactured by Continental Gummiwerke at Hannover. A complete line will be produced starting with the smallest dies to the giant dimensions used for modern long-distance jets.

NEW RESEARCH PROVIDES NATURAL RUBBER IN MANY FORMS

DO YOU KNOW ABOUT THESE?

TC RUBBER. TC (Technically Classified) Rubber helps eliminate cure variations in factory production. Rubber is divided into three classes—Red Circle, Yellow Circle and Blue Circle—based on rate of cure as determined by a strain test on a gum compound.

SP RUBBER. SP (Superior Processing) Rubbers extrude faster, more smoothly and with less die swell than normal rubbers and calender smoother and with less shrinkage. Intricate extrusions do not distort before cure nor sag when pan cured in air or steam.

PA-80. PA-80 Rubber is a concentrated form of SP Rubber. It can be blended with any grade of natural rubber or SBR and with other synthetics to confer SP properties on these elastomers.

A. C. RUBBER. A.C. (Anti-Crystallizing) Rubber has been chemically modified so that it is slightly isomerized. This retards crystallization and permits development of compounds which give improved service over a wide range of sub-zero temperatures.

HEVEAPLUS M. Graft polymers of natural rubber and methyl methacrylate which combine high hardness and impact strength with unusually good elongation for hard stocks—an exceptional combination of properties.

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If you have any questions about Natural Rubber or wish technical literature, just drop us a line.

Technical Service Division **The Natural Rubber Bureau**
1108 Sixteenth Street, N. W., Washington 6, D. C.

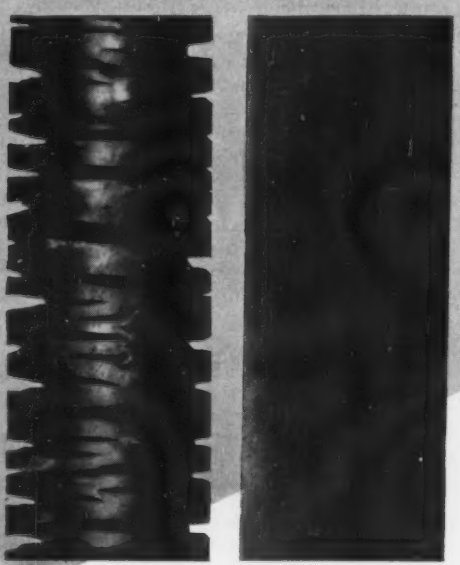
how to vastly increase the useful life of rubber...

Effect of Curing System on Antiozonant Retention in SBR Stocks after Vulcanization

(All contain 3.0 phr UOP 88; 40.0 phr HAF black)

Compound	Accelerator	Sulfur, phr	% Extractable Antiozonant
1082....	2.0 phr benzothiazyl disulfide	2.0	66.4
1083....	1.0 phr benzothiazyl disulfide	2.0	79.6
1087....	None	2.0	~100.0
1088....	1.0 phr benzothiazyl disulfide	3.0	74.6
1083....	1.0 phr benzothiazyl disulfide	2.0	79.6
1089....	1.0 phr benzothiazyl disulfide	1.0	88.6
1083....	1.0 phr benzothiazyl disulfide	2.0	79.6
1084....	1.0 phr N-cyclohexyl-2-benzothiazole sulfenamide	—	—
1093....	1.0 phr diphenylguanidine	2.0	~18.0
1085....	2.0 phr tetramethylthiuram disulfide	—	35.0
1090....	4.0 phr tetramethylthiuram disulfide	—	12.9

The SBR specimens below were exposed to ozone at 100°F with 20 percent elongation for 52 hr. at 33 pphm ozone, then 167 hr. at 63 pphm ozone.



Carbon black—HAF (high abrasion furnace), Curing system—4 phr tetramethylthiuram disulfide; Hours to first crack—7 to 23.

Carbon black—HAF (high abrasion furnace), Curing system—2 phr sulfur, 1 phr N-cyclohexyl-2-benzothiazole sulfenamide. No cracks in 239 hr.

CONSIDER THE EFFECT OF YOUR CURING SYSTEM ON THE EFFECTIVENESS OF A CHEMICAL ANTIOZONANT

In compounding rubber, there are several things which are important in assuring maximum crack-free life. First, you must use a potent antiozonant like UOP 88 or 288. Next, consider what a vast difference in effectiveness can be realized by your *curing system.*

The right antiozonant used in correct proportion is of primary importance. Then, by using the proper accelerator, you can promote its maximum effectiveness, and thus contribute to maximum ozone protection.

Look at the two rubber test strips illustrated. Both were formulated with UOP 88 . . . but note how much more effectively the antiozonant worked when accompanied by this change in curing systems—a vast increase in resistance to cracking. The table above the test strips shows how the *proper* accelerator aids antiozonant effectiveness.

Help in achieving maximum effectiveness from UOP 88 or 288 antiozonants in your rubber formulations is available through UOP facilities and technical personnel. Just write or telephone our Products Department.

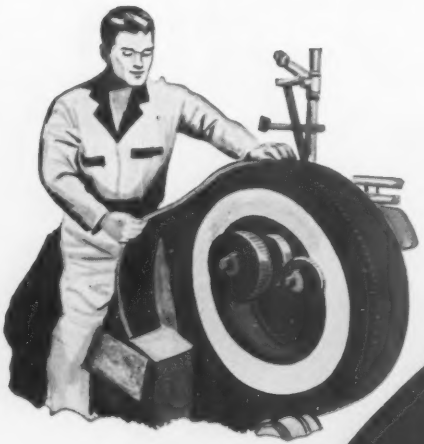
WHERE RESEARCH TODAY MEANS PROGRESS TOMORROW

UOP®

UNIVERSAL OIL PRODUCTS COMPANY
30 Algonquin Road,
Des Plaines, Illinois, U. S. A.

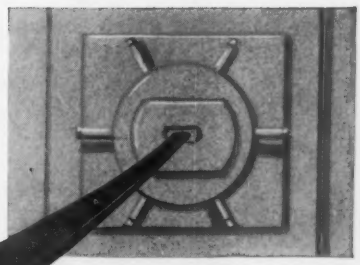
UOP ozone cabinets provide test conditions at a wide range of ozone concentrations.

Centro-



THE GENERAL TIRE & RUBBER COMPANY

Jet®



MAKES TREAD RUBBER BETTER

Use Gentro-Jet, General Tire's new steam-whipped black masterbatch, to get extra quality in tread rubber while enjoying amazing ease of manufacture. Gentro-Jet is available in a variety of compositions to meet every need. It's easy to handle, and eliminates mixing problems encountered when loose black is involved.

Gentro-Jet's high quality and superior dispersion is evidenced by its excellent die conformity . . . you get a better end product, plus easier, faster processing, all at a lower cost than with dry mix masterbatches.

GENTRO-JET BLACK MASTERS OFFER

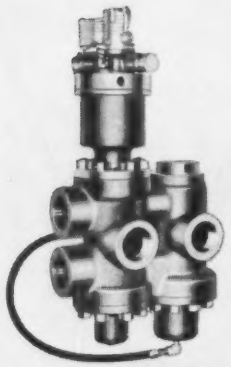
- Easier, cleaner handling
- Faster processing
- Increased road wear
- High gloss, high density extrusions
- Economy in shipping, storage and handling

Chemical Division GENERAL
THE GENERAL TIRE & RUBBER CO.
Gentro-Jet®

Creating Progress Through Chemistry

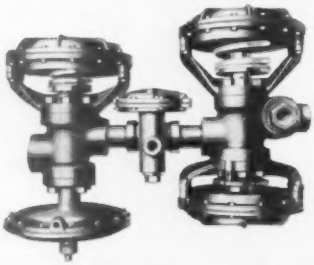
CHEMICAL DIVISION • AKRON, OHIO

Solve your fluid control problems with
SINCLAIR-COLLINS
Diaphragm-Operated Valves

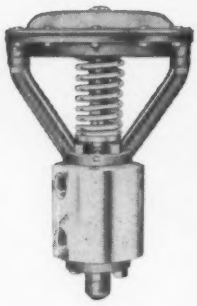


3,000 PSI, 4-WAY SEMI-AUTOMATIC air operated, handles oil, water, glycol-base fluids, 1 - 2 in. NPT.

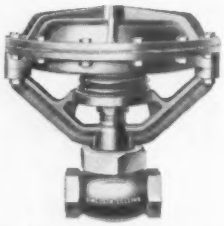
300 PSI, 3-WAY OR REVERSE ACTING bridge yoke, triple-guided stem, ¼ - 3 in. NPT.



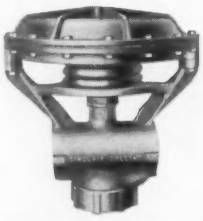
4,000 PSI, 3-WAY AUTOMATIC 2-pressure, auto-neutral, throttling, ½ - 3 in. NPT.



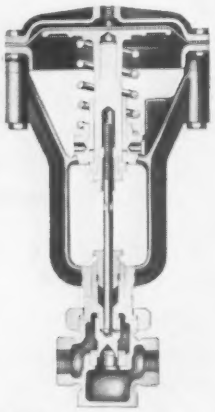
4,000 AND 6,000 PSI, 2 AND 3-WAY BALANCED NC or NO, pressure above or below seats, ½ - 2 in. NPT.



150 AND 300 PSI, DIRECT ACTING globe body, top-guided stem, ¼ - 3 in. NPT.



150 PSI, 3-WAY OR REVERSE ACTING, ¼ - 3 in. NPT VACUUM, 2-WAY, 1 - 3 in. NPT compact design, positive sealing, bridge yoke.



250 PSI, 2-WAY V-PORT MODULATING controls temperature, pressure or flow, direct or reverse acting, ½ - 2 in. NPT.

FOR HOT OR COLD RAW WATER, OIL, AIR, STEAM SERVICE
2, 3, AND 4-WAY • SINGLE OR TWO PRESSURE
HIGH OR LOW PRESSURE • AIR OPERATED
AUTOMATED OR REMOTE MANUAL CONTROL
IDEAL FOR CENTRAL RAW WATER HYDRAULIC SYSTEMS

Chances are, you'll find the answer to your control valve problems in Sinclair-Collins' line. Sound design and highest quality construction . . . Stellite stem seats, Monel stems, hardened replaceable body seats, heavy-duty bronze, ductile iron or cast steel bodies . . . these and many other features assure leak-free performance . . . resistance to corrosion . . . elimination of seat wire drawing . . . longest service life.

For application engineering recommendations, contact your nearby Sinclair-Collins field engineer.

For more information, write for Bulletin SC-59. Address The Sinclair-Collins Valve Company, Akron 11, Ohio, Dept. RA-461.

The SINCLAIR-COLLINS VALVE Co.
DIVISION OF INTERNATIONAL BASIC ECONOMY CORPORATION (IBEC)
AKRON 11, OHIO

8129

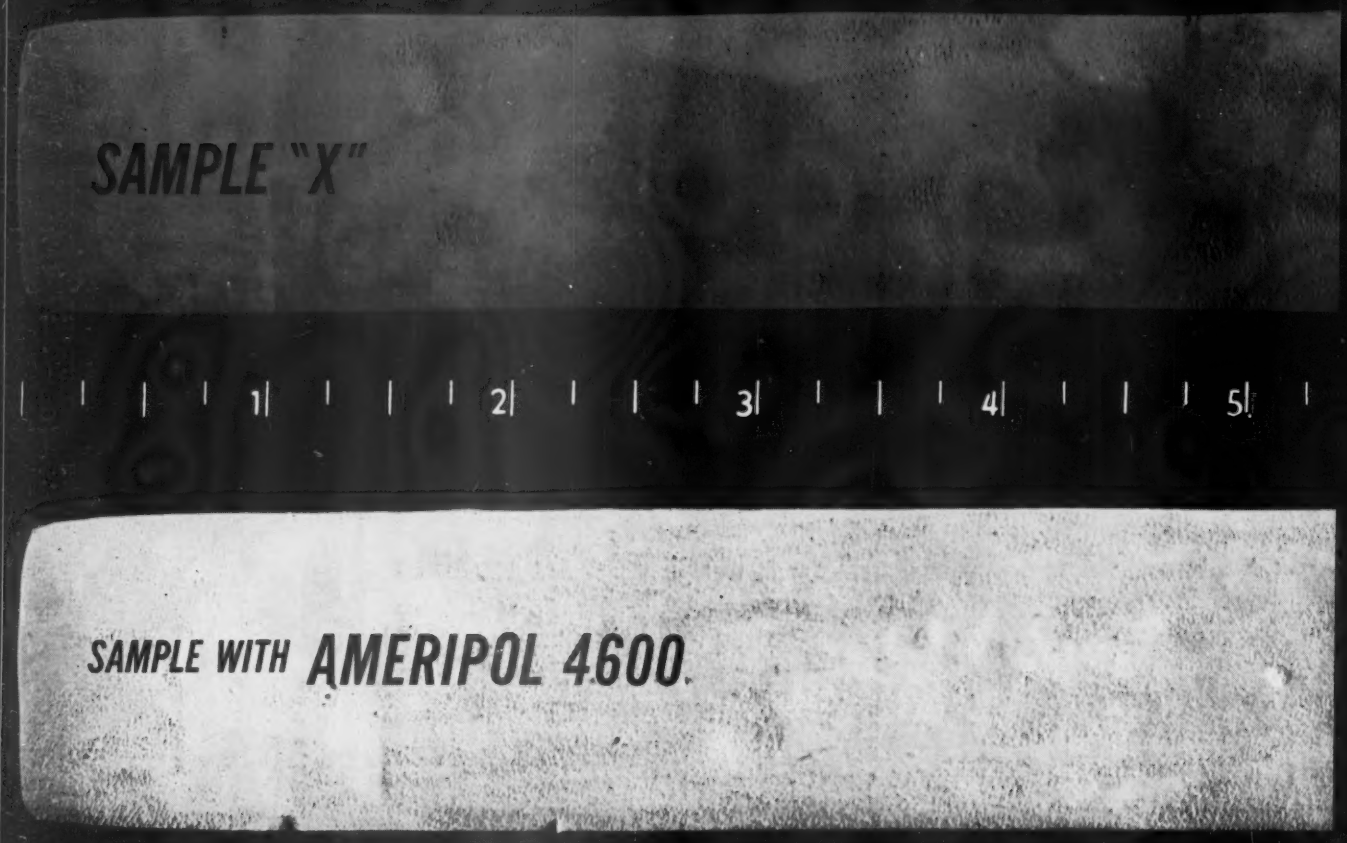
Ameripol Rubber takes to color, like a duck...

The manufacturers of these various rubber products leave color masterbatch compounding to an expert: Disco, Incorporated, of Butler, New Jersey. Disco uses an Ameripol rubber polymer from Goodrich-Gulf since experience has shown its exceptional uniformity, and excellent dispersion characteristics. This simplifies color compounding—and with pigments costing up to 30 dollars a pound, variations can't be tolerated. In addition, Goodrich-Gulf service... in convenient warehousing, dependable delivery, and technical assistance, contributes to an efficient operation. For complete service, come to the world's largest source of synthetic rubber. Goodrich-Gulf Chemicals, Inc., 1717 East 9th Street, Cleveland 14, Ohio.

Ameripol
THE PREFERRED RUBBER

Goodrich-Gulf Chemicals, Inc.

THE ONE TO WATCH FOR NEW DEVELOPMENTS



Ameripol 4600* "Yields" more in sponge recipe

The test strips above show how the Goodrich-Gulf Technical Service Laboratory was able to help a producer of closed-cell sponge shoe soles improve his product.

The customer sent for evaluation a sample of the stock he was using. This stock was not giving the desired cell structure. Weight and density of the finished article were too high. This material is Sample "X"... a blend of a 1703 type of SBR and natural rubber.

A recommended highly loaded recipe using Ameripol 4600 proved superior, as shown by the samples above. Note the more uniform, open cell structure with Ameripol 4600. And the 4600 sample is larger in dimensions. With reduced density, the "Yield" or volume of sponge stock per pound of raw materials was increased.

These qualitative improvements were realized at a considerable savings. Use of the recipe with 4600

Ameripol
THE PREFERRED RUBBER

COMPARISON OF SAMPLES

	Sample "X"	Sample with Ameripol 4600
Cost per pound	$ .2975	$ .1880
Cost on a pound/volume basis	.1630	.0987
Defo Hardness	3500 gm.	2250 gm.
Per cent recovery	99.4%	97.7%

...has better cell structure, too!

cut cost from 16.3 to 9.8¢ on a pound/volume basis.

These results show the advantages of working with Goodrich-Gulf on your rubber needs. Since we produce the broadest range of SBR polymers, we have a wealth of technical data and know-how to share. And our Technical Service Group is ready to help. Put Goodrich-Gulf to work on your team!

**Assigned ASTM number is now Ameripol 1511*

RECIPE USING AMERIPOL 4600

Recipe phr	Parts
Ameripol 4600	100
Goodrite 2007	20
RPA #6	0.5
Zinc oxide	5
Aquarex NS	1.75
Titanium dioxide	10
Hard clay	60
Silene EF	20
Agerite Superlite	2
Aktone	2.9
L. P. Circo Oil	10
Unicel ND	8
Petrolatum	3
Altax	1
Sulfur	3
Total	**247.15**

The stocks (0.25 inch slabs) were cured in a Ross flex mold for 8 minutes at 307°F. (confined), followed by 10 minutes at 307°F. (unconfined), then aged 8 hours at 212°F. in a circulating air oven.

Methods for manufacture of closed cell sponge are covered by various U. S. and foreign patents; these should be checked and necessary licenses obtained before use of such processes.

Goodrich-Gulf Chemicals, Inc.

1717 EAST NINTH STREET • CLEVELAND 14, OHIO

Ameripol
THE PREFERRED RUBBER

YOU GET THE WIDEST SELECTION OF SBR POLYMERS FROM GOODRICH-GULF ...WITH TECHNICAL SERVICE TO HELP YOU IN PROPER APPLICATION

Ameripol NON-PIGMENTED RUBBERS

NON-PIGMENTED HOT RUBBERS

1000 Staining. General purpose rubber, easy processing, good aging, for wide range of molded and extruded products.

1001 Slightly staining. General purpose rubber, similar to Ameripol 1000, used where less discoloration is required.

1002 Staining. Similar to Ameripol 1000, exhibits more tack in processing.

1006* Non-staining. General purpose rubber for light colored and white products.

1007 Staining. Good electrical resistance properties. Reduced water absorption.

1009* Non-staining. Has little or no nerve in milling, used as a processing aid in other rubbers.

1011 Non-staining. Tackier in processing than Ameripol 1006, used in adhesives, tapes, molded and extruded goods.

1012* Non-staining. High Mooney 1006. Ideal for cement applications. Excellent flow characteristics and high green strength in compounded stocks. Used to increase tensile and hardness in non-black stocks.

1013* Non-staining. High bound styrene content provides greater thermal plasticity and excellent flow characteristics.

1019 Non-staining. Glue acid coagulated. Low ash content and special finishing result in a polymer that is excellent for wire and cable applications.

*Available in either bale or crumb form.

NON-PIGMENTED COLD RUBBERS

1500 Staining. General purpose cold rubber, better physicals, usually better processing than hot rubbers.

1501 Slightly staining. Similar to 1500, better resistance to staining and discoloring.

1502 Non-staining. General purpose rubber for light colored and white products.

1503 Non-staining. Cold version of Ameripol 1019 for wire and cable applications.

1509 (formerly 4601) Non-staining. Coagulated with Alum making it suitable for low water absorption applications. A medium low viscosity polymer.

1511 (formerly 4600) Non-staining. For light colored and white products. Good physicals on aging. Fast pigment incorporation. Reduced Mooney viscosity.

4604 Non-staining. High bound styrene polymer which is extremely suitable for sponge work, both open and closed cell. Has good processing characteristics.

NON-PIGMENTED OIL-EXTENDED RUBBERS

1703 Non-staining. General purpose 25-part naphthenic oil-extended polymer.

1705 Staining. General purpose 25-part aromatic oil-extended, improved processing and aging.

1707 Non-staining. General purpose where higher oil, 37½-part, can be used. Contains rosin acid for extra tack.

1708 Non-staining. 37½-part oil-extended, highly resistant to discoloration and stain.

1710 Staining. Similar to 1705, higher oil level. Easy processing, excellent physicals at lower cost.

1712 Staining. 37½-part oil-extended, superior processing.

4700 Non-staining. 50-part oil-extended, for greatest economy.

Ameripol MICRO-BLACK MASTERBATCH RUBBERS

MICRO-BLACK MASTERBATCH COLD TYPES

1605 Non-staining. Easy processing extrusion polymer with 50 parts of FEF black also suitable for manufacture of high quality molded goods.

1606 (formerly 4659) Staining. 52 parts of HAF black and 10 parts of HA oil. Used sucessfully for retreading.

1608 (formerly 4664) Staining. A quality tread rubber consisting of 52 parts of ISAF black and 12.5 parts of HA oil.

1609 (formerly 4667) Staining. This SAF Micro-Black can be used to an advantage in applications requiring high abrasion resistance; premium quality products can be made from this polymer. Made of 40 parts SAF black and 5 parts HA oil.

1610 (formerly 4660) Staining. 52 parts ISAF black and 10 parts HA oil. High abrasion resistance suitable for tires camelback.

4651 Staining. 62.5 parts of HAF black and 12 parts of HP oil. Used in camelback tires and mechanical goods.

MICRO-BLACK MASTERBATCH COLD, OIL-EXTENDED TYPES

1805 Non-staining. A low cost general purpose rubber of 75 parts HAF black and 37.5 parts N oil.

1808 Staining. This 75 parts HAF black and 50 parts HA oil polymer is very suitable for camelback and low cost molded and extruded goods.

1809 Staining. 75 parts HAF black and 37.5 HA oil. Applications include tires, camelback and mechanical goods.

4756 Staining. Intermediate loading of black and oil produces quality tread stocks. Contains 75 parts HAF black and 37.5 parts A oil.

4758 Staining. A low cost tread rubber consisting of 82.5 parts of ISAF black and 62.5 parts of HA oil.

4759 Staining. 75 parts ISAF black and 37.5 parts A oil. Applications include high quality camelback and tires.

4761 Staining. 65 parts SAF black and 37.5 parts A oil. Especially suitable where superior abrasion resistance is needed.

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Isobutylene-Isoprene co-polymers of solid rubber consistency having average molecular weight range between Vistanex LM and MM.

VISTANEX MM

VISTANEX MM
Polyisobutylene polymers having a high degree of elasticity and average molecular weight range of 64,000 to 135,000.

These polymers, because of their excellent resistance to aging, ozone and chemicals, viscosity stability over wide temperature range, and their permanent tack, offer the compounder great latitude in designing and formulation for:

- Cements
- Pressure sensitive adhesives
- Laminating adhesives
- Caulking and sealing compounds
- Tackifiers
- Blending with polyethylene or wax

Also for other applications such as: impregnating leather, binder for eraser compounds and base for paints.

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As Ken Soule Sees It

by Kenneth J. Soule

The Bumpy Road Home

The "New Products" section of the N. Y. Herald Tribune (2/26/61), led off with the following news bit: "Judging from the chuck-holed condition of the streets after the last of the recent snow had been scraped away, there is need for the new product offered by U. S. Rubber Reclaiming Co., Buffalo, N. Y. The new material, called 'Ramflex,' is made of devulcanized rubber in powder form. When mixed with asphaltic concrete, it is said to make possible city streets, roadways and driveways that won't crack in cold weather, 'bleed' in hot weather or ravel at the edges."

The above item struck very responsive chords in my whole being. As a long-time rubber man, my interest in any "new" rubber product is obvious. To a considerably shook-up motorist driving over, around, and through pot-holes, craters and heaved sections of winter-devastated suburban roads, the prospect of rubber-cushioned relief was most heartening.

To be brought completely up to date on "Ramflex"—as well as to soothe my tortured torso still further—a letter was rushed off to the U. S. Rubber Reclaiming Co. requesting complete data. Sales literature, technical information and product samples were received by return mail. All of this material was examined carefully and with complete objectivity. (It hardly needs saying that I have no personal interest in this particular road additive or in those of any other supplier.)

Several points seem apparent from a study of the "Ramflex" exhibit. First, the product is *not* "new," as previously stated, but has been in use as a road building ingredient for at least eight or ten years. Second, in addition to the virtues mentioned in the "Tribune" article, the incorporation of such a properly prepared ground rubber into the asphaltic mix enables highway superintendents to get a new road or hot patch back in use sooner. And even mo important, such a highway lasts much longer than would without rubber. These facts seem well and adequately documented. Incidentally, the amount of rubber used to accomplish these surprising results need only be about six pounds, in a mix with 120 lbs. of asphalt and some 1800 lbs. of sand, stone and filler.

Why then, you might well ask, aren't "rubber roads" in more common or widespread use in this country? To find the answer to this same question we asked several personal friends—qualified rubber men, who are real experts on the subject. They also had no axes to grind, nor any rubber road additives to sell. Their answer: "Knowledge of the benefits possible from such use of rubber is not well enough distributed. Also, road building is full of politics and all manner of self seekers. Finally, *too many* operators take the attitude that it is foolish to make a roadway "too good," since you are just doing yourself out of repairs and repeat work."

So—there you are. It would seem conclusive that asphaltic roads in *your* county can be made much better by including some properly prepared rubber in the base mix. Widespread experience in Europe gives even more vehement support to the same conclusion. If your overtaxed pocket book and your own classy chassis (as well as that of your long-suffering auto) cry out for speedy relief from unnecessarily poor roads, how about plugging for the rubberized product to every important person you know? It would be a blessing for all concerned—even the hesitant road builders themselves.

(By the way, in *surface retreatment* of asphaltic roads, the inclusion of a small per cent of neoprene latex is said to provide substantially improved life and performance. But—that is a different facet of the road problem.)

Quiet Class Rooms

The lowly blackboard has long been one of the most effective aids of the elementary school teacher. Writing on the board, by both teacher and pupils, has enabled the entire class to participate in a given study easily and completely. The one potential hazard inherent in this mass education effort has inevitably been the possibility that some adolescent chalk wielder would manage, intentionally or accidentally, to produce a nerve-wracking squeal or screech as he (or she), drew the chalk over the board. Of course, this would serve a useful purpose by waking up any slumberers. However, on the negative side, such a piercing, high-pitched, ear-splitting sound is enough to upset the entire class, and prevent the orderly pursuit of knowledge for a considerable length of time.

Luckily for dedicated and overworked teachers, as well as for the cause of education itself, relief is on the way. According to an item in the "Bakelite Review", science has developed a substitute for the present-day blackboard which is completely screech-proof. This answer to a school master's prayer consists of a "new chalk-board surfacing material formulated from vinyl plastic." It comes in

three colors—green, blue, or black—and is furnished as a baked-on coating on steel panels. The three cooperating companies to whom grateful teachers may want to erect memorials are Union Carbide Plastics, (the resin), John L. Armitage and Company (formulators of the "Armorsol" vinyl coating), and Virginia Metal Products, Inc. (producers of the complete vinyl chalkboard).

Minor complaints may come from certain juveniles, prevented from expressing themselves fully, freely, and noisily! Also, from foreigners attempting to understand our English, "as she is spoke." (How can a *black*board be blue or green?) To both groups we can only say—"Don't worry about it, that's how the chalk talks!"

Roll, Music, Roll

Considerable brain furrowing is taking place these days in an effort to explain the recent resurgence of interest in player pianos. Their previous heyday was in the first quarter of the present century, and in 1923, sales of this type accounted for over 60% of all pianos sold. At that time, all of the big name manufacturers, including Steinway, produced players. Punched paper rolls were turned out by the millions during that period, and although no new automatic pianos were made from 1928 to 1956, a few companies still continued to produce new rolls monthly.

It is pretty generally agreed that radio pushed player pianos far into the background in the late 1920's, but there does not seem to be any clear-cut explanation for their re-birth. Creighton Peet, in a most interesting article in "Today's Living," notes that people may have become fascinated by seeing them in TV Westerns. On the contrary, he seems to feel that one of the player piano's main attractions lies in the fact that even a non-musician can use it to make music. In fact, by pedalling or working various levers, the rankest amateur can improve on, or at least modify recordings by the greatest artists. He, and his friends, by following the words printed on the music roll, can also make beautiful vocal music to help out the piano player.

In any case, according to Mr. Peet, one man who is not worrying a bit as to the exact cause of the renaissance of popular interest in player pianos is John Duffy of Palisades Park, N. J. For about fifteen years he worked as a tugboat captain engaged in carrying lines of freight cars around New York harbor. Then, about seven years ago, he became interested in old players, and gradually became an expert in their construction and intricate inner workings.

This inevitably led him to set up for the repair, rehabilitation and refurbishing of ailing pianos, old and new, in a shop and showroom on his home town's main street. Business has progressed to the point where he has now resigned from his marine job and, in addition, requires the services of four mechanics to help him keep up with the current demands. Besides putting old player pianos in good working order, Mr. Duffy will also add various special attachments to the customer's machines—if desired. These include: snare drums, glockenspiels, xylophones, cymbals, or you name it. Or, if you and your upstairs neighbors are the quiet type, these extra sound (or unsound) effects can be omitted, and a layer of noise-deadening fiber board added to the back of the instrument.

Obviously, there are a myriad of parts, attachments, and widely varied equipment inside these automatic music dispensers, each and every piece doing its bit to produce the melody called for on the sound track. John Duffy has learned, (the hard way), the function of all of them, as well as how and why they operate. He knows how to replace an aged or worn part, and the permissible materials to use. As far as the life-giving air tubing is concerned, he is positive that there is *no* acceptable substitute for good quality natural rubber. Plastic will not do since it tends to take a permanent set and become loose on the fittings under the continued pulsations and the movements of the attachments. Since the 200-odd feet of 9/64-inch tubing required by each machine is cut up into a host of pieces, it is obviously impractical to depend on anything else other than a force-fit over the metal ferrules.

So, if you live in the New York Metropolitan area, and if your old player piano needs a new lease on life, or if you would like to start up your own "Sing Along With Me" club, or if you just yearn for some old-time tunes to drown out any and all off-key rock and rollers, Mr. John Duffy could be your man! He seems to know the answers, and is ready, willing and anxious to help you. For those outside the New York area, he even has a $75 kit, with which competent home mechanics can make repairs on their own player-pianos.

Sartorial Notes

"They sold 6,000,000 umbrellas in Britain last year. Not content with that, they are trying to introduce men's umbrellas in checks and stripes, in green and maroon. Don't laugh! Once upon a time all cars were black, too."

* * *

Pogonologists will be interested in the news, also from London, that quite a few men have started wearing stage make-up beards for evening. "From five o'clock shadow to six-o-clock Vandyke."

The above comes courtesy of the "bits and pieces" column of Wallachs in New York City.

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Base Compound

Component	PHR (dry basis)
Neoprene latex, type 571	100.0
Aquarex D*	0.5
ZnO	5.0
Ammoniated casein	0.5
Pennox A	2.0
TiO_2	25.0

*E. I. du Pont de Nemours & Co., Elastomer Chemicals Dept.

	Thiocarbanilide 1.0 PHR						Merac 2.0 PHR						Merac 6.0 PHR					
Cure Min @ 280°F	No aging			Aged 40 hours @ 280°F			No aging			Aged 40 hours @ 280°F			No aging			Aged 40 hours @ 280°F		
	M500	T	E	M500	T	E	M500	T	E	M500	T	E	M500	T	E	M500	T	E
45	630	1220	690	—	700	350	400	2050	960	—	1000	450	500	2400	900	1100	1450	600
60	700	1540	700	—	800	380	480	2020	940	—	920	420	500	2500	910	1000	1450	590
75	680	1100	600	—	810	400	480	2100	870	—	920	410	580	2250	875	970	1400	600

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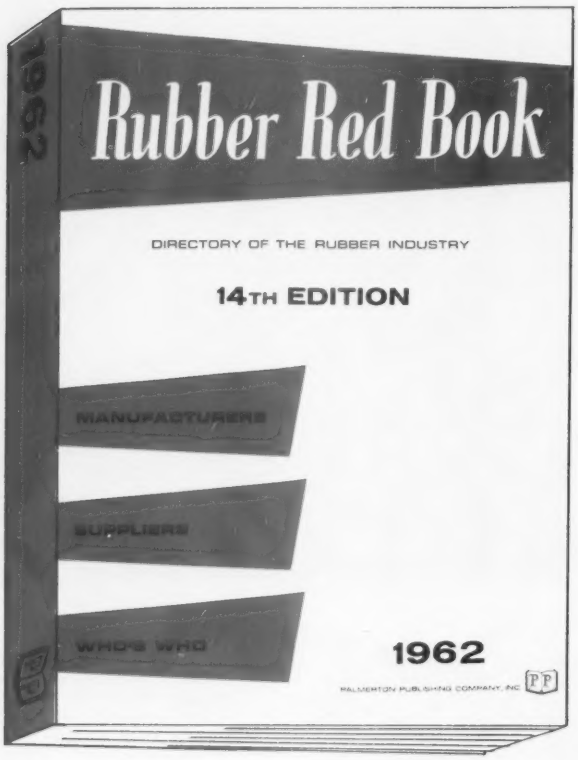

1962 ISSUE
14th EDITION
ADVERTISING CLOSING DATE:
AUGUST 31, 1961
PUBLICATION DATE:
OCTOBER 1961

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Suppliers, showing complete product classification of machinery and equipment, chemicals, fabrics, raw rubbers, latex, etc.

Who's Who—15,000 names, titles and company connections of people in the industry.

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Major savings to suppliers are possible through the Catalog Insert Plan. Under this, the publisher prints an insert of as many pages as may be required with enough copies to serve both as an insert in RUBBER RED BOOK and as sales literature for the supplier's own sales staff. By having the publisher do the printing, many items of cost are either reduced or absorbed by the publisher, thus making possible significant savings to the advertiser. Rates under this Plan are based primarily on the number of pages in the catalog and the number of extra copies required.

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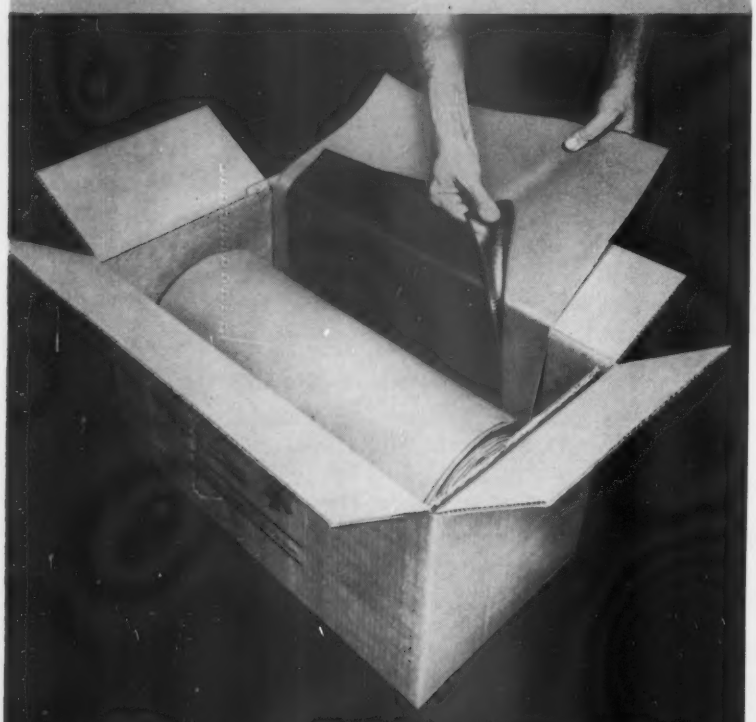

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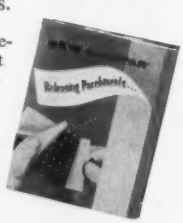

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News in Brief

► Montecatini is offering a $3600 fellowship for research in high polymers at the Polytechnic Institute of Milan (Italy) during the 1961-62 academic year. The fellowship is being handled by the America-Italy Society, 22 East 60th St., New York 22, N. Y.

► Answers to basic questions about the nature, purpose, and performance of cold-setting flexible mold compounds and practical information on how to use them are provided in a bulletin published by Smooth-On Mfg. Co., Jersey City, N. J.

► Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio, has awarded a contract to the Chemical Plants Division of Blaw-Knox Co., Pittsburgh, Penna., for the design and construction of its *cis*-polybutadiene facility at Institute, West. Va.

► The Associated Industries of Massachusetts has presented an award to the B. F. Goodrich Footwear and Flooring Co., Watertown, Mass., for charter and continuous membership in the association.

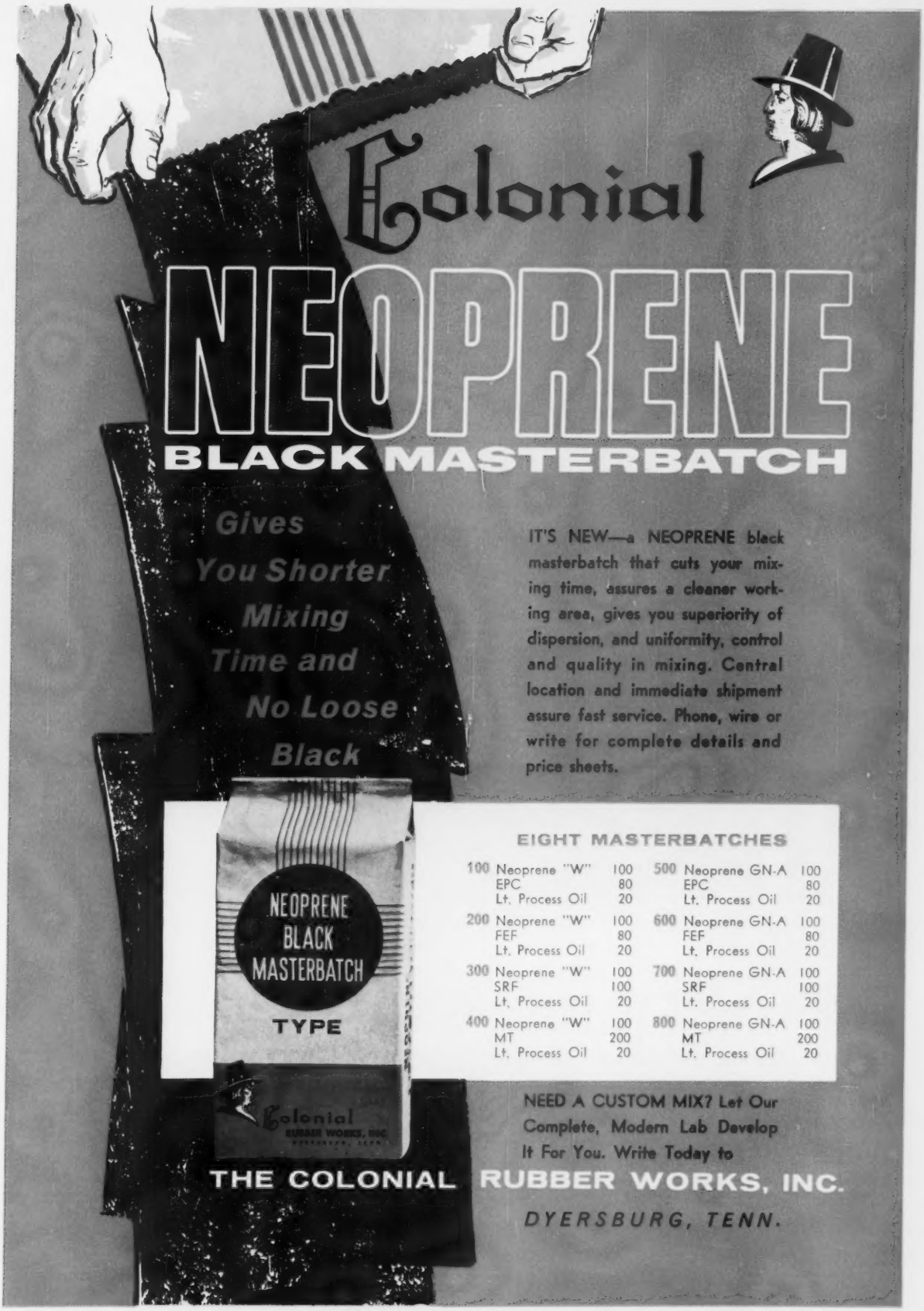
► A new development laboratory set up by Heisler Corp., Wilmington, Del., for plastics and elastomers compounding and powdered resins, will be equipped to undertake large-scale contract studies.

► Vulcanized Rubber and Plastics Co. has consolidated its executive, general, and division sales offices, formerly located in New York City, in Morrisville, Penna.

► Adamson United Co., Akron, Ohio, has been commended by the National Safety Council for its long, accident-free industrial record. The company operated 521,485 man hours, from December 21, 1959, to December 31, 1960, without a disabling injury.

► Axel Plastics Research Laboratories has moved its factory and offices to larger quarters, and is now located at 41-14 29th St., Long Island City, N. Y.

An index to Volume 88 of RUBBER AGE will be found on pages 177 to 180 of this issue.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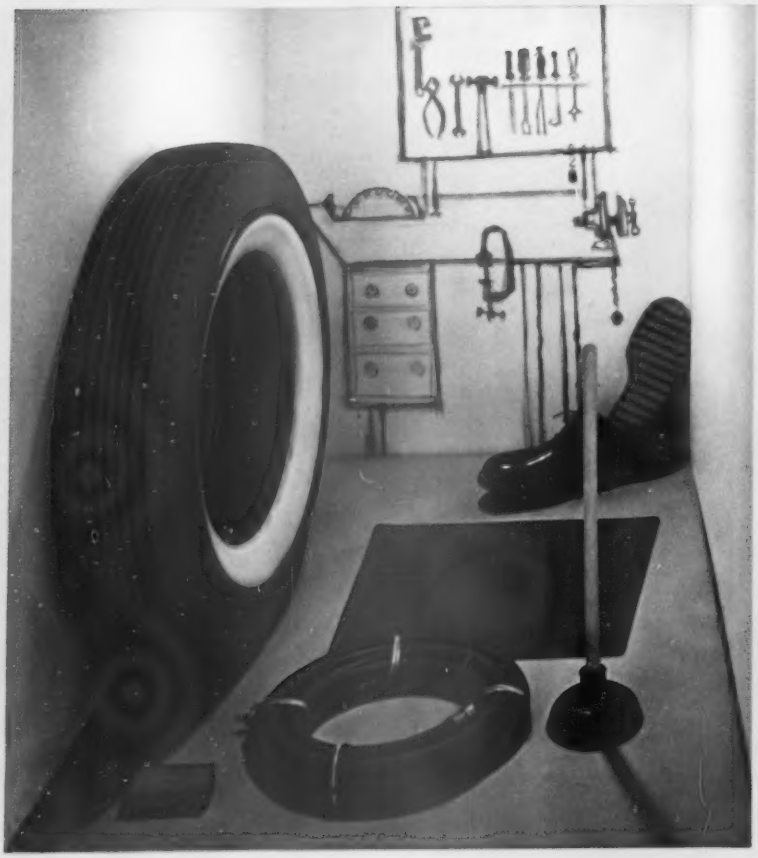
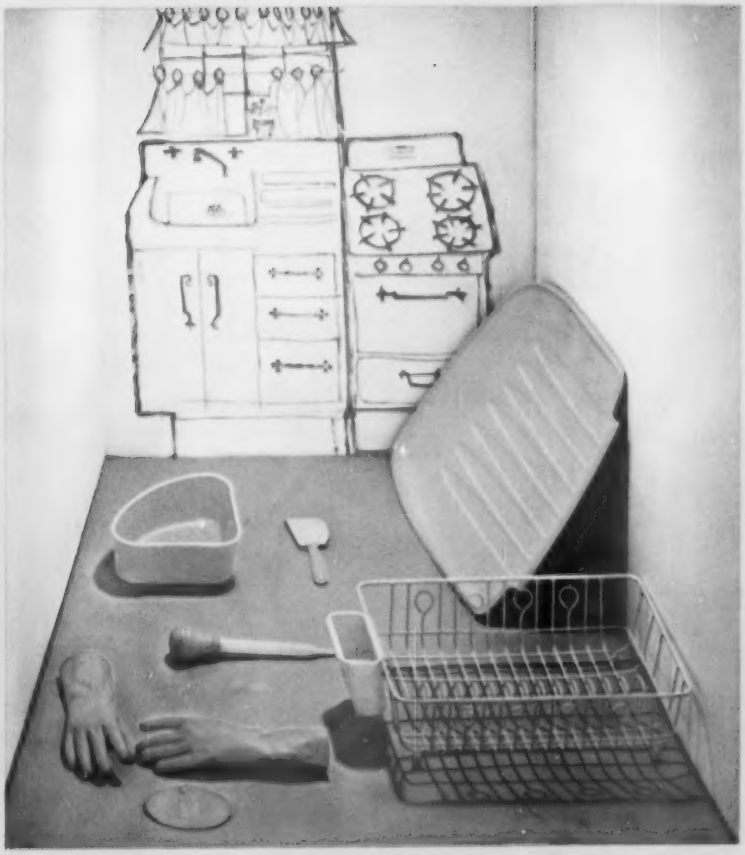
EPC 80
Lt. Process Oil 20
200 Neoprene "W" 100
FEF 80
Lt. Process Oil 20
300 Neoprene "W" 100
SRF 100
Lt. Process Oil 20
400 Neoprene "W" 100
MT 200
Lt. Process Oil 20
500 Neoprene GN-A 100
EPC 80
Lt. Process Oil 20
600 Neoprene GN-A 100
FEF 80
Lt. Process Oil 20
700 Neoprene GN-A 100
SRF 100
Lt. Process Oil 20
800 Neoprene GN-A 100
MT 200
Lt. Process Oil 20
NEED A CUSTOM MIX? Let Our Complete, Modern Lab Develop It For You. Write Today to
THE COLONIAL RUBBER WORKS, INC.
DYERSBURG, TENN.



HI-SIL®, SILENE® & CALCENE® OPEN NEW PROFIT DOORS WITH COLOR



From kitchen to gameroom and out to the garage, your rubber goods . . . touched by color's sales magic . . . stand a better chance of winning the battle for consumer choice.

And Hi-Sil, Silene and Calcene, the *white* reinforcing pigments make color practical. Your designers have full command over the palette . . . from the excitement of bright hues to subdued pastel moods . . . from new transparent effects to this year's rich, deep tones.

Best of all, there's no sacrifice of physical properties with Columbia-Southern white reinforcing pigments. A full range of physicals is possible with straight or combination loadings of Hi-Sil, Silene and Calcene.

Our rubber specialists will be happy to help you tag *your* brand with color or upgrade properties on present color lines. Just call our district office nearest you.

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PITTSBURGH PLATE GLASS COMPANY

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now you can save 25% on every TiO_2 dollar

AND GET HIGHER BRIGHTNESS WITH CYANAMID'S NEW UNITANE® OR-450

It's true!...A dollar's worth of this rutile titanium dioxide, Unitane OR-450, gives a brightness of 77.4 compared to anatase TiO_2 brightness of 74.3. Seventy-five cents worth of OR-450 gives a brightness of 75.4—still higher than conventional rubber grades of anatase, and it does it with significantly less pigment. In a typical white compound, you can reduce pigment content as much as 30.4% over a full quantity of anatase...and still get higher brightness. Result...better products and savings of 25% on every TiO_2 dollar you spend. Unitane OR-450 is ideal for rubber, plastics and floor covering. It offers a bluer undertone than other rutile pigments...masks yellowness more effectively and economically than anatase pigments. Abrasiveness is low, dispersion easy. With Unitane OR-450, you benefit from exceptionally high whitening power and tinting strength. Call your Cyanamid Pigments representative today and arrange for a working sample of this outstanding rutile grade. We're so sure you'll like it we have stocked commercial quantities. Your order will be shipped promptly. *Whiter and Brighter with Unitane.*

CYANAMID

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HORSE HEAD® A-420

- HORSE HEAD A-420 is particularly suited for all types of rubber compounding, including latex. It incorporates readily, producing bright whites and clean tints.
- In whitewalls of tires, A-420 contributes free-chalking properties and dynamic flex-crack resistance.
- In rubber compounds designed for low moisture absorption, such as those for electrical applications and mechanical goods (packings), A-420 is frequently employed because of its low water-soluble-salts content.
- Send for a sample now. Check it against your color and brightness standards.

TITANIUM DIOXIDE

THE NEW JERSEY ZINC COMPANY 160 Front Street, New York 38, N. Y.

Founded 1848

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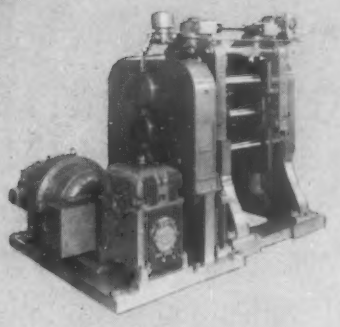
ST. LAWRENCE CHEMICAL COMPANY, LTD. TORONTO, ONT. • MONTREAL, QUE.

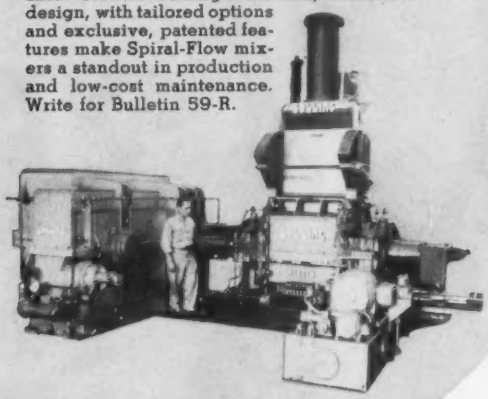


CALENDERS

Stewart Bolling calenders have long since established their worth by their dependable, rugged design, and versatility in use. Modern appearance, flexible design, and realistic cost enhance their use in any rubber manufacturing plant. 2-, 3-, and 4-roll standard and special calenders are offered, from 8" x 16" through 22" x 62". Write for catalog 58-M.

MIXERS

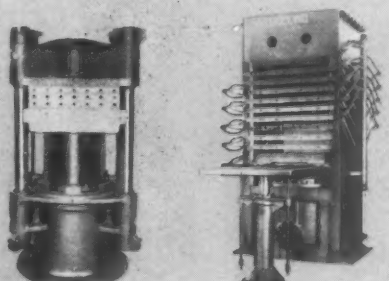
The Stewart Bolling Spiral-Flow intensive mixer line embraces a laboratory model, a lab-production size, and four production capacities, to fulfill any mixing requirement. Four types of drives can be furnished. Three kinds of discharge doors are available. Stewart Bolling's modern, seasoned design, with tailored options and exclusive, patented features make Spiral-Flow mixers a standout in production and low-cost maintenance. Write for Bulletin 59-R.

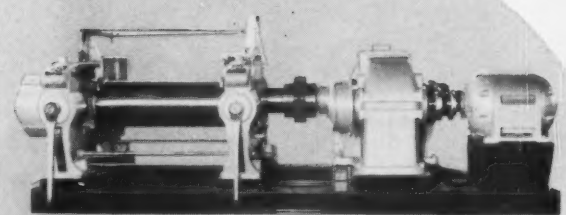


PRODUCTION and LABORATORY MACHINERY

PRESSES

Stewart Bolling compression and transfer molding presses in every usable size, in all basic types of construction, answer every practical need. Slab side presses range from 20" x 20" to 48" x 48"; 150- to 1250-ton pressures. 4-bolt line from 14" x 14" up; pressures 50 to 2500 tons. Also full- and semi-ring high pressure 22" x 22" to 48" x 48"; 500 to 2000 tons . . . Single- or multi-decked, steam or electrical heat. Massive, deflection-resisting for production with accuracy. Write for Catalog 58-P.





MILLS

The widest range of laboratory mills is now presented by Stewart Bolling. ULTRA, deluxe and standard models start with a 2½" dia., 7" wide roll mill. Eleven sizes in all are topped by the 26" dia., 100" wide roll mill. Special requirements can be met in roll speeds, lengths and widths. Stewart Bolling also has direct-connected drives, shown above on a 60" roll mill. All Stewart Bolling mills are described in Catalog 58-M.

Stewart Bolling

& Company, Inc.

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Designers and Builders of Machinery for the Rubber and Plastics Industries

Intensive Mixers • Calenders • Mills • Refiners • Crackers • Dust Grinders • Sheeters
Hydraulic Presses • Pump Units • Accumulators • Elevators • Bale Splitters • Vulcanizers
Speed Reducers • Gears • Extruders

..."r'arin' to go"

Construction on our new furnace black plant in Big Spring, Texas, is progressing on schedule and we will soon be "r'arin' to go."

When this plant goes "on stream" it will be the most highly automated Carbon Black plant in the industry. Virtually every segment of the process from the metering and control of oil, gas, water, electricity and air entering the plant to handling the loading of the finished product is automatically controlled. Literally, from feedstock to loaded cars, the black is "untouched by human hands."

In working out the plant layout, designing the equipment and automatic control schemes, the basic idea has been that automatic controls will give reproducibility of the product, guard its quality and contribute to make your processing easier.

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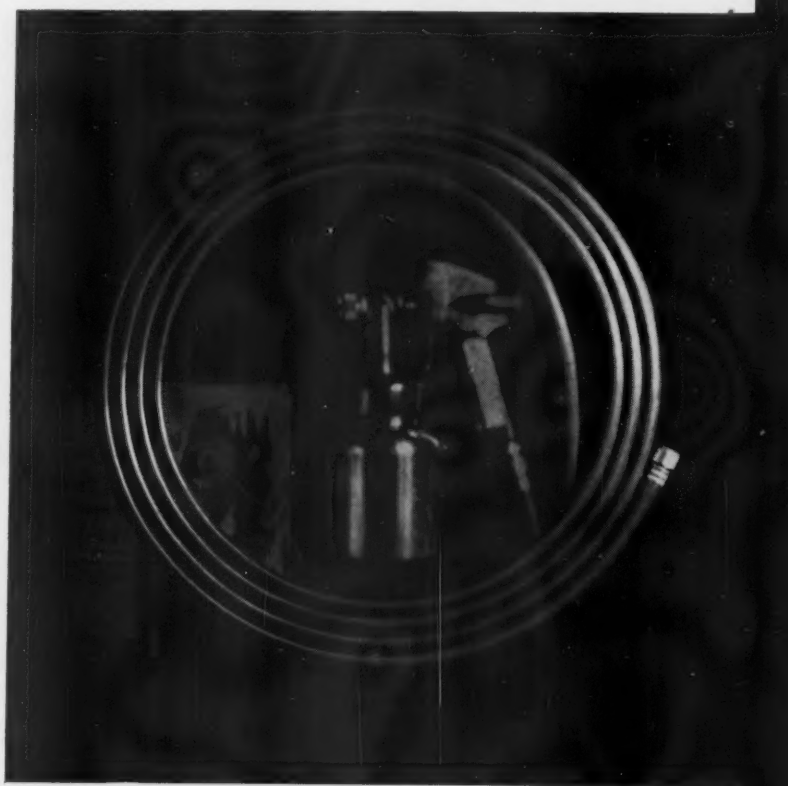
WHY POLYSULFIDE CRUDES

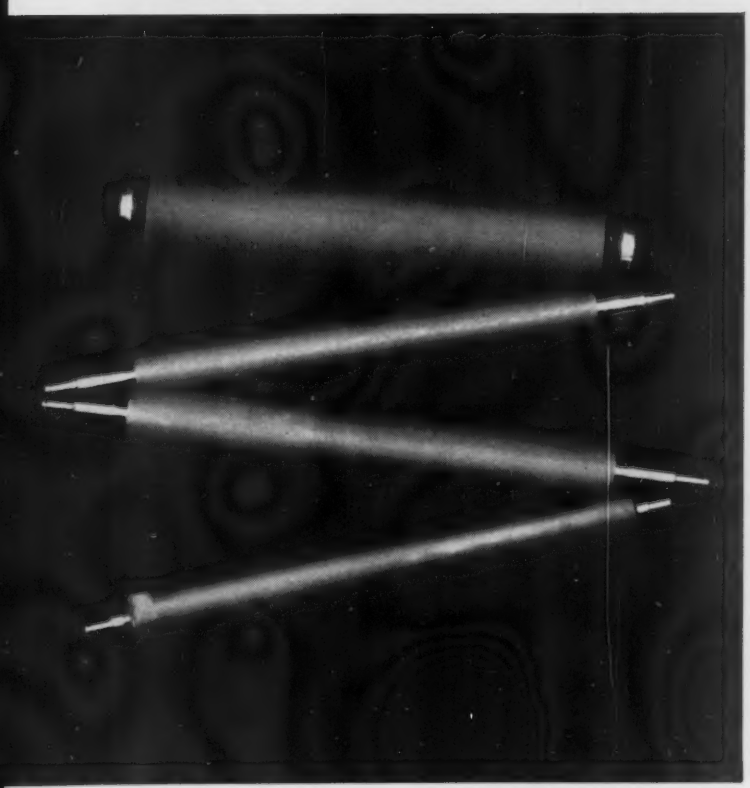
HIGH SOLVENT RESISTANCE. Industry has found no other elastomers perform so well so long under exposure to oils, aromatic fuels, chemicals, solvents and other degrading liquids as THIOKOL polysulfide crudes. Top name manufacturers of paint spray equipment, for example, have made polysulfide rubber the traditional choice for lining hose. As a carrier of paint, solvent, thinners, THIOKOL polysulfide rubber provides trouble-free service years on end.



LOW TEMPERATURE FLEXIBILITY. Though the mercury drops far below zero, polysulfide crudes stand up—without plasticizers. No brittleness. No cracking. No loss of serviceability. In demanding applications such as gaskets and O-rings in aircraft fuel systems, THIOKOL polysulfide rubber keeps its resiliency through the low temperatures of high altitudes. Rubber components, hose, sheeting can be fabricated for service at temperatures to minus 65 deg. F.

ARE PICKED FOR THE BIG JOB

IMPERMEABILITY TO GASES. From sheets of polysulfide rubber or fabrics coated with it, manufacturers of gas meter and regulator diaphragms are producing the most reliable measuring components ever. THIOKOL polysulfide crudes maintain full integrity though constantly exposed to degrading gases, sunlight, ozone, vapors and to wear of diaphragmatic action.



LONG LIFE. Widening use on printing and coating rollers constantly subjected to solvents, thinners and physical stress underscores ability of THIOKOL polysulfide crudes to deliver long service life under severe conditions.

Thiokol offers comprehensive technical literature detailing properties and performance characteristics of polysulfide crudes. Copies of this helpful material will be mailed to you on request. Write on your letterhead, or use handy coupon.

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THIOKOL CHEMICAL CORPORATION
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Gentlemen: Please send further information about following properties of polysulfide crudes: ☐ High solvent resistance
☐ Impermeability to gases
☐ Low temperature flexibility

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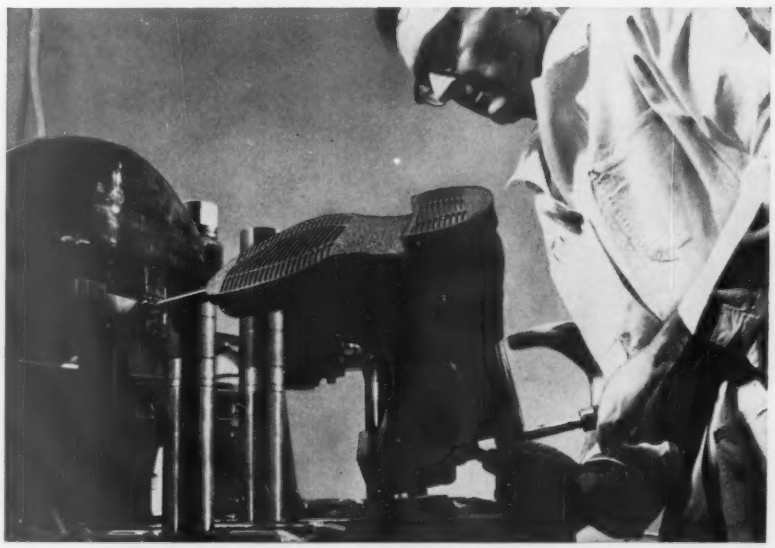
BULLETIN:

Shell Chemical tears brand-new shoes apart in the search for better footwear, flooring, tires and bottle nipples

Shell's Technical Service Laboratory is a department of self-criticism. Every new rubber that Shell develops must make the grade here before it can be sold.

Read about the men who run this laboratory—the unusual way they are helping the shoe industry find new polymers and manufacturing methods—and how they can help your company solve costly problems.



A Shell Chemist puts the finishing touches on a mold-on shoe sole. Next, he will tear it apart for analysis. This is one of many tests at Shell's Technical Service Laboratory that aid in the discovery of new and more economical rubber polymers.

THE MEN at Shell Chemical's Technical Service Laboratory are practically jacks-of-all-trades. Recently, they became cobblers.

To develop new rubber and processing techniques for the footwear industry, Shell installed three shoemaking machines. Each machine cures a rubber sole and molds it onto a shoe top.

Shell tears new shoes apart

The shoes made by Shell do not stay in one piece for long. They are deliberately torn apart for thorough testing.

Shell technicians then study the sole. Its color. How it adheres to its top. And the most economical way to make each shoe.

This analysis results in new and better polymers and production methods for shoe manufacturers. And better soles and heels for their customers.

This work with shoe polymers also pays off in other products. They range from heavy-duty tires to bottle nipples. Shell Chemical's SP-103 makes durable floor tile as well as shoe soles. And the easy processability of Shell's S-1509, useful in the mold-on sole process, is also an advantage in making automotive sponge. New applications are being found every day.

Shell's first customer

New Shell polymers and latices encounter rigid testing and analysis by these experts. That is why this laboratory is called "Shell's first customer."

But sometimes manufacturing problems arise even with fully accredited polymers. When this happens, Shell is ready to go to work at once.

Many special application problems are solved in the laboratory in a matter of hours—others take days. If a problem calls for on-the-spot assistance, Shell sends its men to work with the plant's own technical staff.

Moneysaving help

If Shell Chemical's Technical Service Laboratory can help you solve a costly problem, call your Shell representative. Or write Shell Chemical, Synthetic Rubber Division, P.O. Box 216, Torrance, California.

A Bulletin from

Shell Chemical Company

Synthetic Rubber Division

capitol cues

CONGRESS WILL PASS A LOT MORE OF KENNEDY'S PROGRAM than first reports have indicated. The opening months of the session...as is the case with any new Congress...have been devoted to organizing and hearings. Besides, the new White House team has needed time to draft its policies. But now things are beginning to move. There'll be opposition from the expanded Republican contingent, plus some Democrats. But Kennedy now has a majority on the Rules Committee and a powerful prod to Congressmen in the form of job patronage.

The most the opposition seems likely to do is water down some of Kennedy's proposals. It may delay action a bit or trim the amount of money involved. In the end, the programs will pass. Many of them will add to industry's costs, one way or another.

Here is the latest appraisal of these programs' chances:
-Higher minimum wage--Congress will lift it to $1.25 hourly but won't extend coverage to all the workers Kennedy wants.
-Medical care for the aged--Financing with Social Security... partly at the employers' expense...is meeting such strong opposition that its backers may put off a vote until 1962.
-Depressed areas--Kennedy is getting the bulk of his request.
-Aid to education--Money seems certain for classroom building and scholarships, but not for financing teacher's salaries.

APRIL'S BUSINESS STATISTICS WILL MAKE BETTER READING, say economists in government and industry--a reassuring note that may help offset current bad news. April is when the experts think the downturn will come to an end. The stepped-up rate of federal spending will make itself felt this Spring. Spurred by Easter and better weather, people will start buying more, too.

Specifically, here's what the economists will be watching:
-Auto sales--Will there be a seasonal pick-up this Spring?
-Home building--Will reducing mortgage rates spur activity?
-Inventories--Will industry and consumers be needing goods so that they will have to start reordering at higher rates?
-Employment--Will there be a significant pick-up in jobs?

The economists are convinced that all these indicators will look better when the April figures are in. They concede that the subsequent recovery may be slow and fairly extended.

KENNEDY'S PLANS FOR HALTING THE RECESSION are disappointing some of his liberal supporters. They also agree business will bottom out in April. But they feel that Kennedy should be asking for more spending and a tax cut. Their big worry is that the coming recovery in business won't be fast enough to start the economy growing at the rate that they believe is now necessary. Without additional pushing, they see the economy limping along on a plateau.

One of the important developments of Kennedy's first weeks in office--as far as business is concerned--is the conservative tone of his policies. He will still push spending programs and a bigger role for the government. But he'll move slowly ...waiting till economic growth generates necessary revenues.

capitol cues (cont'd)

PROFITS OF CORPORATIONS WILL ALSO TURN UP this quarter--or the next. Rising costs and intense competition have been pinching earnings for a year. But once the turn in business comes, rising output will lift productivity. The profits increase will be slow. You won't see any new record this year. This prospect helps explain why stock prices began to rise a while back.

THE KENNEDY ADMINISTRATION WILL STEP INTO BIG STRIKES that threaten to hurt the economy. That's the meaning of its role in the N.Y. tug strike and the later walkout of flight engineers on the nation's leading airlines. The new policy is to intervene before strikes reach the full disaster stage. Kennedy's prestige will be laid on the line in efforts to shorten stoppages.

LABOR SECRETARY GOLDBERG IS BECOMING A KEY MAN in Kennedy's Cabinet. This would be very unusual. The Labor head has never been powerful before. But Arthur Goldberg has caught Kennedy's eye for several important reasons. Goldberg settled the tug strike. He made a well-publicized tour of areas of heavy unemployment. And he has led the fight for key Kennedy bills. These include the depressed area, minimum wage, and jobless benefit bills.

> Kennedy considers Goldberg a "ball of fire" and admires his intellectual bent. The President has also been impressed by Goldberg's readiness to assume positions contrary to those held by his ex-employers at the AFL-CIO. Example: Goldberg opposes, for now, the unions' goal of a shorter workweek.

LABOR'S PLANS TO ORGANIZE WHITE-COLLAR WORKERS should not be taken lightly. AFL-CIO leaders are deeply disturbed by current trends in union membership. Their numbers aren't keeping up with the labor force's growth. Even more upsetting to them is the fact that, in many cases, membership is down absolutely. Meanwhile, the Teamsters, outside the AFL-CIO, have grown.

> The labor chiefs fully appreciate the fact that white-collar employees now outnumber industry's production workers. So, clearly, the white collars are the best hope for recruits. Dynamic Walter Reuther will lead the drive, with new powers.

THE COSTS OF MEDICAL CARE WILL SPURT QUITE SHARPLY this year--maybe by 4% or 5%. The steady pace of late years will quicken. Almost all items will rise. This is going to mean an increase in costs for many companies. Higher charges for care will mean upward revision in "fringe" benefit costs.

> Here's the outlook for specific medical care items:
> -Hospital insurance will climb 7½%, as more people claim it.
> -Hospital rates will rise 7%, with wages and bed shortages.
> -Doctors' fees will go up 2-3%...a bit less than in 1956-59.
> -Prescription costs will hold steady after recent sliding.
>
> Medical care costs will keep rising for years, if Kennedy's program for the aged is enacted. Giving the old folks new benefits would tax facilities and push costs up generally.

"HOW TO KEEP IN TOUCH WITH U.S. GOVERNMENT PUBLICATIONS," a booklet available from the Government Printing Office (Washington 25, D.C.), is a guide to the many hundreds of useful items put out each year. It is free.

Moving to new territory?

RUBBER AGE

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When you add new products or branch out into new territory, you can let the greatest number of people know about it in the shortest possible time by telling the story in the advertising pages of RUBBER AGE.

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THIS MAN KNOWS RUBBER

WILLIAM P. "BILL" DENSON, JR., is a customer's man . . . one who sees costs and results from the individual customer's point of view. He's a young man who's grown up in the rubber industry, and has a strong 17-year background in the research and development of synthetic and latices. *He knows rubber* . . . . and he considers *your* problems *his* problems.

As Technical Representative, "Bill" Denson is the "Have Data Will Travel" man of Copolymer's home team . . . and he's concerned with helping our customers achieve the best results with Copolymer products. He knows that Copolymer products have been designed and developed to fulfill every need . . . and he's always ready to help you select the *right* rubber for your particular manufacturing process. Make a note to call him soon.

Copolymer

RUBBER & CHEMICAL CORPORATION
Phone: ELgin 5-5655 P. O. Box 2591, Baton Rouge, Louisiana

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Overseas

Amsterdam—The establishment of two synthetic rubber plants in the industrial Pernis area of the Netherlands is reported to be attracting new industries which will supply these operations. The two synthetic rubber plants were set up by Royal Dutch-Shell and Esso. Pennsalt Chemical Corp. and Fabriek van Chemische Producten N.V. of Schiedam will build a $2 million plant for the production of sulphuric compounds and other chemical products, and Cabot Corporation, Boston, Mass., will build a carbon black plant in cooperation with Royal Ketjen of Amsterdam.

Ceylon—Levies on rubber exports have been lowered by 8 rupees per 100 pounds, from 39.805 rupees to 31.805 rupees, effective November 24, 1960 (one rupee equals U.S. 21¢). Export duties have been raised to 30 rupees per 100 pounds, an increase of 10 rupees, while the licensing fee of 18 rupees has been abolished, resulting in a net reduction of 8 rupees. Miscellaneous export taxes total 1.805 rupees per 100 pounds of rubber.

Paris—Ethyl-Synthese has awarded a contract for construction of a major styrene installation at Lillebonne, France, to Societe Belge de l'Azote et des Produits Chimiques du Marly, of Belgium. The facility will have a capacity of 50 to 60 million pounds a year, and will utilize a production process licensed by Koppers Co. for five styrene plants already built by Societe Belge.

Dominican Republic—A second rubber factory at Piedra Blanca for the processing of latex from local experimental plantations is being set up by the Department of Agriculture. Additional factories are projected as more plantations are established. The first factory produces rubber sheet, chiefly for the shoe industry.

Western Nigeria—The Western Nigerian Development Corporation has begun construction of a 139,000 pound rubber processing factory at the Araromi rubber estate. It will make sheet rubber, lumps and crepe from latex produced at the Araromi plantation.

Rome—The Italian Ministry of Transport is selling internally 860 tons of natural ribbed smoked sheet rubber in bales from the state-owned stockpile.

Dar es Salaam—The Michelin Tyre Co. is said to have concluded negotiations for a site at Arusha, Tanganyika, where it will build a factory.

My primary concern as Technical Representative is helping our customers obtain the exact results they want from Copolymer products. Your problems are my problems, including the complete scope of rubber compounding, processing techniques, proper product selection, economic balances, cost ratios and all of the many other factors which our customers must consider.

In *our* plant, I work closely with the men who create and develop Copolymer products. In our *customers'* plants, I see these polymers transformed into finished rubber goods. I feel my job is unique and gratifying because it permits me to observe both sides of the manufacturing process.

I feel I know *Copolymer Rubber* and how our products are designed to react. I know the *integrity of Copolymer* products, and that their uniform properties and characteristics mean consistent performance, time after time.

Our polymers, masterbatches and latices are *Products of Integrity*—each designed and developed to do a specific job, and do it well. But, we are never satisfied with making just *good* products . . . at Copolymer, we're always looking for new ways to make good products even better.

I am proud to be a part of Copolymer's team of rubber specialists whose experience and know-how help me to be of service to you. I would consider it a pleasure to visit with you to discuss the better integration of Copolymer products into your manufacturing process. Please feel free to call upon me at any time.

William P. Denson, Jr.

Copolymer

RUBBER & CHEMICAL CORPORATION

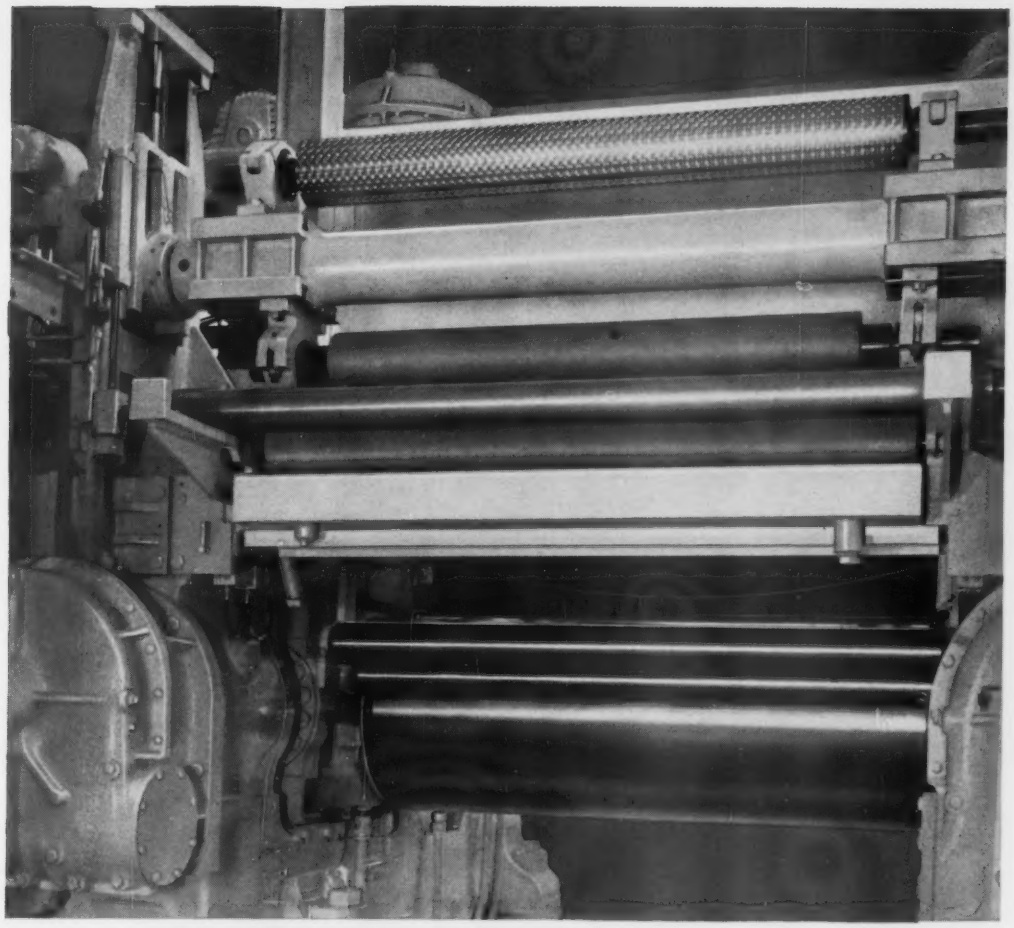
Phone: ELgin 5-5655 P. O. Box 2591, Baton Rouge, Louisiana

Products shape up faster with Diamond **Millical.**

This low-cost extender speeds up production cycles because curing time is faster than clays, ground whiting or carbon black. Mixes easily. Gives smooth extrusions that hold shape and form perfectly. Calenders with a smooth surface . . . strengthens tensile and tear properties. And for black compounds, holds excellent black sheen with minimum degrading of physical properties.

Get information and technical help on Millical today—from your Diamond representative. Or write DIAMOND ALKALI COMPANY, 300 Union Commerce Building, Cleveland 14, O.

Diamond Chemicals



This plastics calender is one of the most versatile ever built

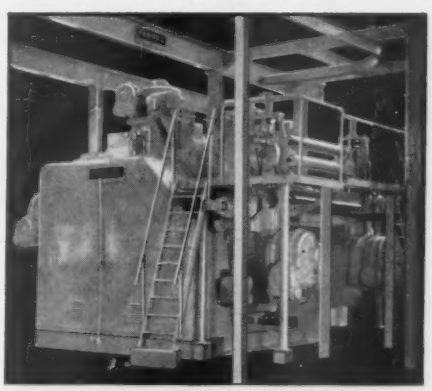
The Farrel calender pictured here was built for a company that processes a variety of plastics products. The machine will produce the full range—from the thickest sheeting to the thinnest film.

Contributing to its versatility is the new automatic turret embosser, shown above, which is designed to take all of the customer's existing rolls plus those to be used in the future. Two embossing rolls are carried in the turret. Either may be brought to the ready position within ten seconds by pushing a button—without breaking the sheet.

The calender, itself, is a 500°F Uni-drive machine, with an independent drive for the number 4 roll and a maximum delivery speed of 110 yards per minute. Operation at high temperatures under heavy loads is made possible by a special sleeve-bearing design.

Great attention has been given the lubrication system which uses twin pumps mounted in parallel for individual push-button operation. Other features include such well-known Farrel developments as two-speed motorized roll adjustment, motorized guides and the cross-axis device.

Discover for yourself how Farrel engineering pays off in calendering quality and versatility. Ask to see a Farrel engineer.



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FB-1214

Artistic Wire Products made the dish rack. Emmco Products Div. of Essex Master Mold made the boots. The Stanley Chemical Company, E. Berlin, Conn. provided the formulated dispersions for these applications.

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Both these colorful products have a smooth, tough, non-marring surface, thanks to BAKELITE Vinyl Dispersion Resins. And both will have long life because vinyl dispersions are non-oxidizing and unaffected by long exposure to water.

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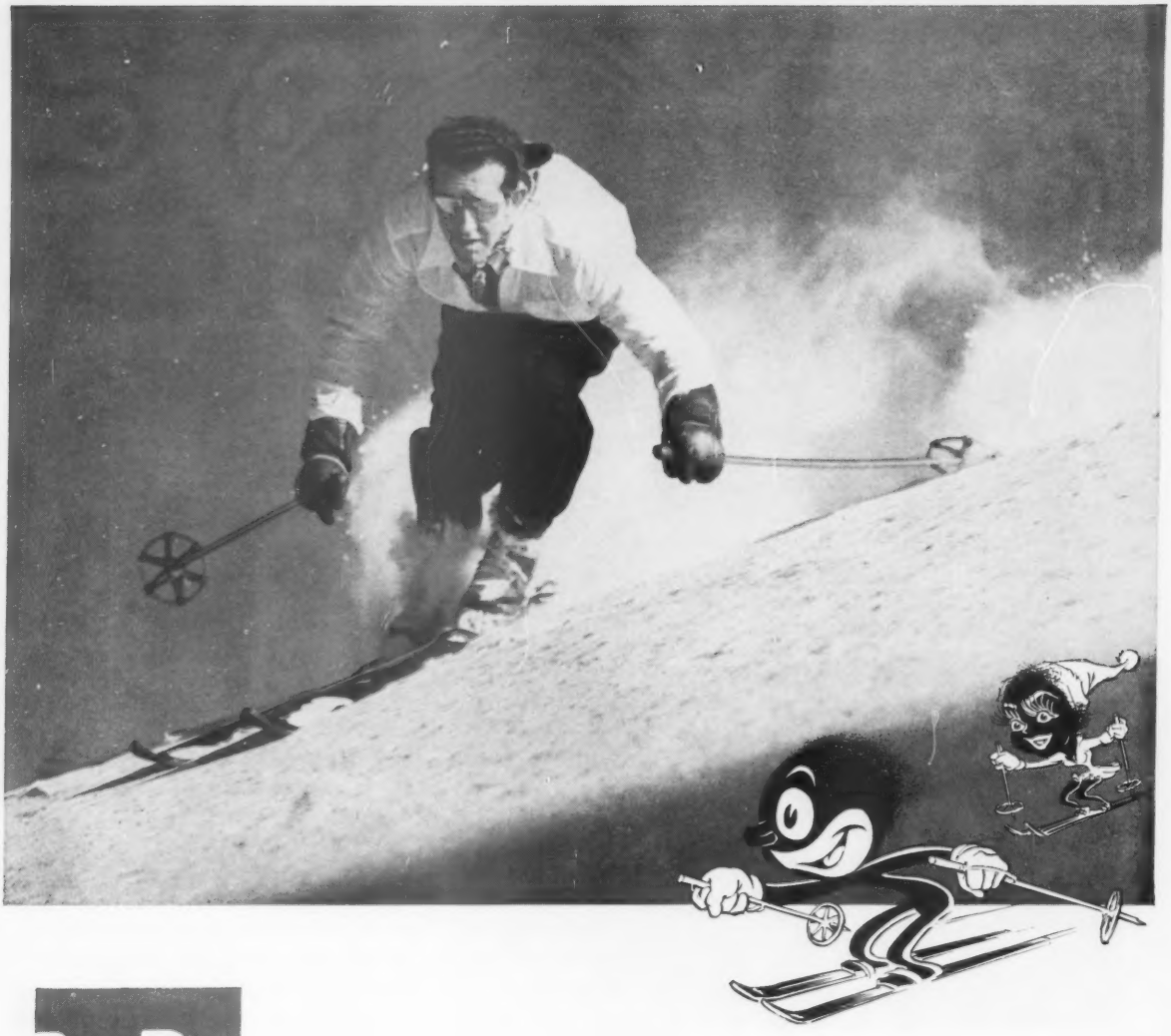

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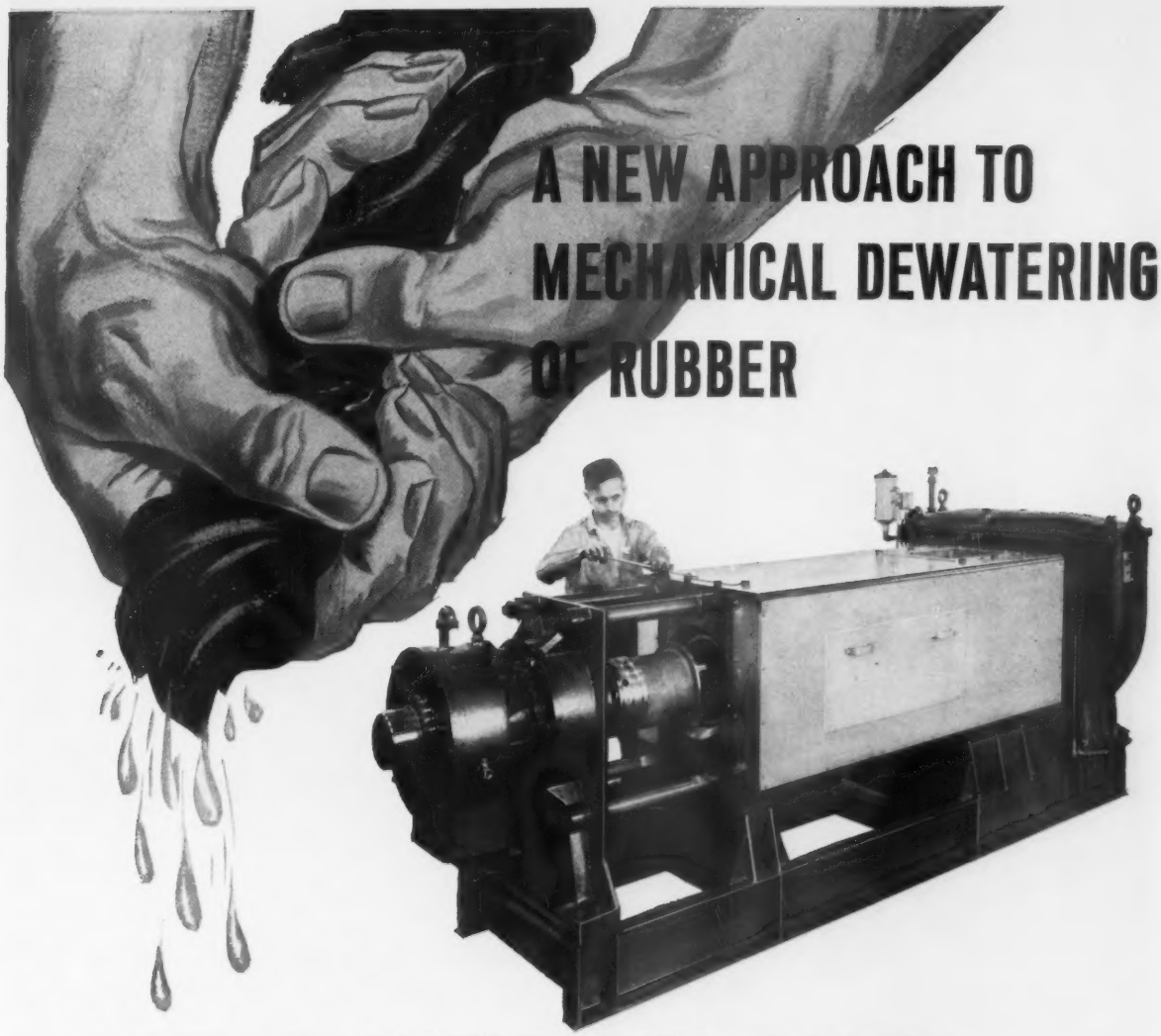

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PATENT REVIEW

by Melvin Nord

Prolonging the Life of Pneumatic Tires

U. S. Patent 2,948,321, issued August 9, 1960, to Lewis C. Mote, provides a method for prolonging the life of pneumatic tires by dissipating heat from the tread.

The device consists essentially of an elongated flexible metallic ribbon (10), preferably of aluminum. In Fig. 1, which shows a tubed tire, the metallic ribbon (10) is placed between the outer side of the inner tube and the inside of the tire casing, its ends extending to the outside atmosphere as shown. In the case of tubeless tires, as shown in Fig. 2, the metallic ribbon (10) is treated with a coating of rubber to prevent air leakage from the tire at the point where the ribbon passes under the beads (13 and 14). To strengthen the ribbon (10) and to aid in securing it to the inside of the tire casing, a nylon cord (20) is secured to the entire length of the ribbon.

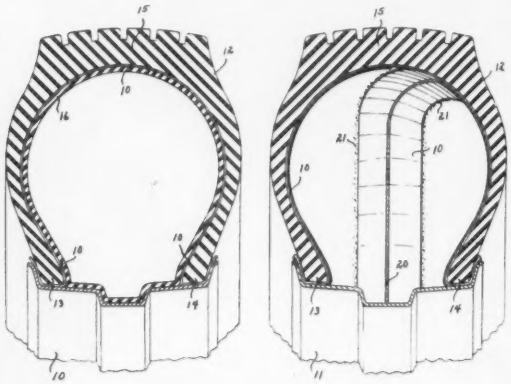
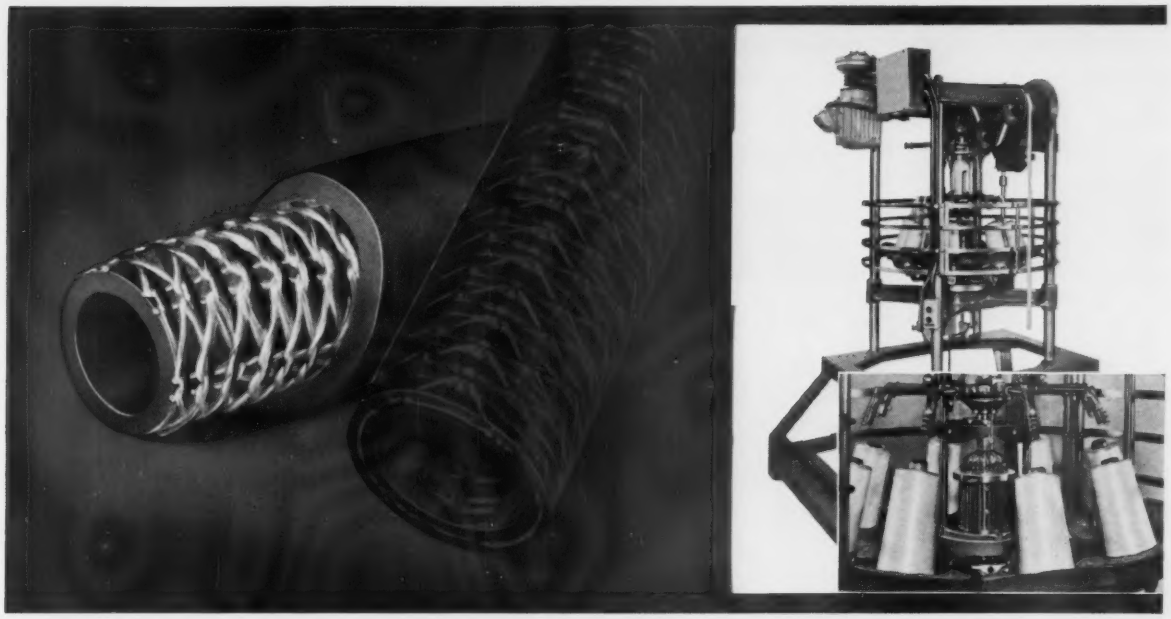


Fig. 1 Fig. 2

The explanations offered for the increased life of the tire are that heat is removed from the tire, there is a reduction of static electricity, and the aluminum foil ribbon oxidizes preferentially to the tire.

Cure of Chlorofluorocarbon Elastomer

U. S. Patent 2,944,927, issued July 12, 1960, to Lucian P. Dosmann and assigned to the United States Rubber Co., describes a method of making a laminated article having a layer made of unsaturated, vulcanizable rubber, and a layer made of a saturated elastomer which is a copolymer of monochlorotrifluoroethylene and vinylene fluoride. The unsaturated rubber is compounded for sulfur



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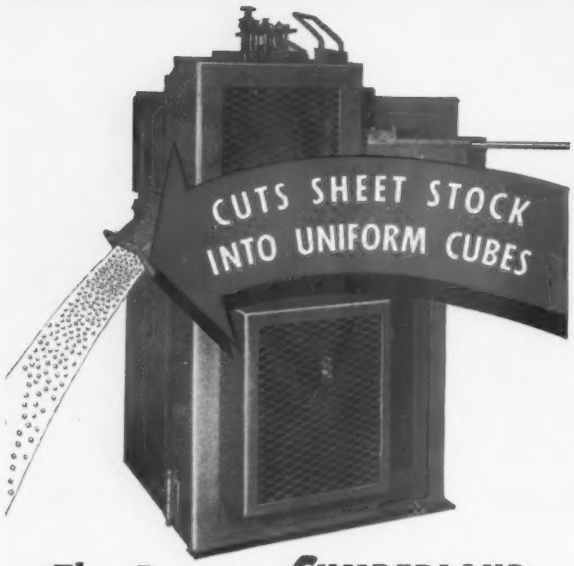

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PATENT REVIEW

vulcanization. The saturated elastomer (100 parts) is compounded with a peroxide as a curing agent (1 to 5 parts) and N,N¹-methylene-bisacrylamide as an accelerator (1 to 20 parts). The saturated and unsaturated elastomers have the same curing rates. The resulting two compounded stocks are laminated, and the laminate is cured at 150° to 350°F.

Preparation of Foamed Rubber Latex

U. S. Patent 2,945,826, issued July 19, 1960, to Lilian F. Everett and assigned to the Hairlok Co., Ltd., discloses a method of producing a foamed rubber latex containing gelatinized starch. To a foamable and coagulable liquid mix containing rubber in suspension, about 1 to 8 per cent of a finely divided ungelatinized starch is added. The mix is then formed into a foam, and the foam is set to form a coagulated cellular mass at a temperature insufficient to cause the gelatinization of the starch. The mass is then heated to a temperature sufficient to cause bursting of the starch grains and gelatinization of the starch.

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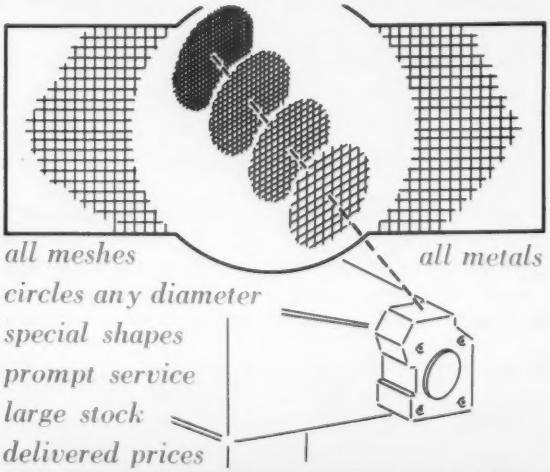

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U.S. **RUBBER RECLAIMING CO., INC.**
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PATENT REVIEW

Reclaiming of Scrap Rubber

U. S. Patent 2,939,850, issued June 7, 1960, to Robert E. Clayton and assigned to the Esso Research & Engineering Co., provides a process for reclaiming scrap rubber with a polymer oil-sulfur mixture containing 1 to 25 parts of sulfur to 100 parts of hydrocarbon polymer oil. The polymer oil is prepared by preheating to 250 to 350°F. a highly olefinic feed, obtained from a mixture of depentanized distillate and debutanized bottoms, passing the preheated feed through a clay treating zone, and separating by distillation the desired hydrocarbon polymer oil.

All-Rubber Tubeless Tire Valve

U. S. Patent 2,936,017, issued May 10, 1960, to Georgie P. McCord and assigned to the United States Rubber Co., provides a one-piece all-rubber tubeless tire valve having a self-closing inflating passage through which an inflating needle may be inserted. The valve is installed in the opening in the rim, with an inflation needle installed through the recesses. The squeezing of the valve into position during its insertion in the rim, and the tire pressure, seal the recesses during normal operation.

Other Patents of Interest

Subject	Inventor or Assignee	Patent No.	Date
Recorder used with a rubber mill	U. S. Rubber Co.	2,939,757	6/ 7/60
Modified rubber latex	Rohm & Haas Co.	2,939,852	6/ 7/60
Polypropylene-butyl rubber blends	Esso Research & Engineering Co.	2,939,860	6/ 7/60
Rubber vulcanizates	Firestone Tire & Rubber Co.	2,939,861	6/ 7/60
Vulcanization process	Farbenfabriken Bayer	2,941,979	6/21/60
Method of curing rubbery fluoro-elastomers	U. S. Rubber Co.	2,941,987	6/21/60
Vulcanizing machine	Willis L. Hewatt	2,942,296	6/28/60
Tire	James Snell	2,942,641	6/28/60
Tire with valve in a sidewall	B. F. Goodrich Co.	2,942,642	6/28/60
Production of reinforced rubber articles	Guiberson Corp.	2,943,009	6/28/60
Sulfur-vulcanizable rubber composition	Union Carbide Corp.	2,943,073	6/28/60
Styrene-modified rubbery compositions	Dow Chemical Co.	2,943,075	6/28/60
Vulcanizing rubber with propynyl sulfenamides	Monsanto Chemical Co.	2,943,079	6/28/60

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No. 14

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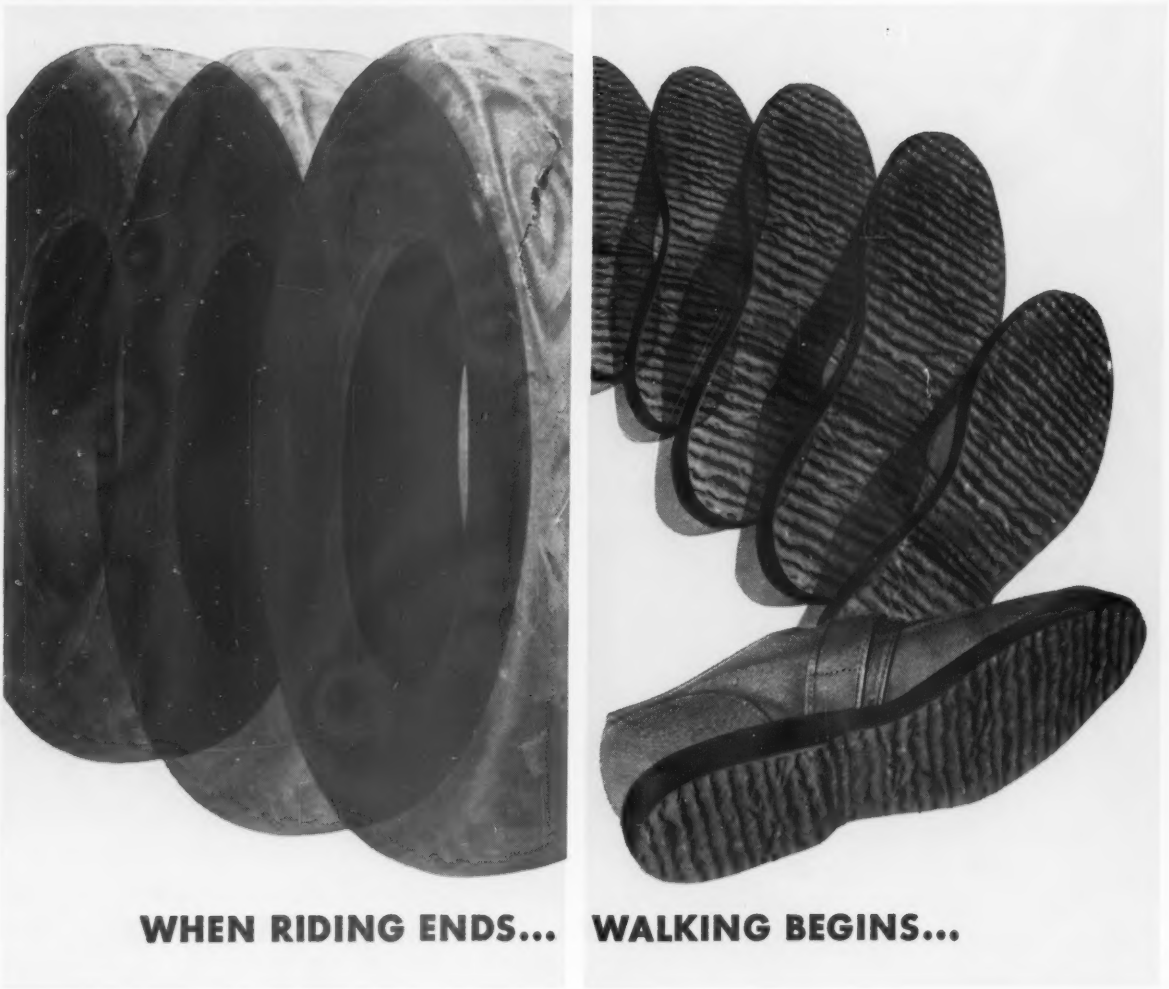

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Radiation and Natural Rubber Latex

By T. C. GREGSON, T. H. ROGERS, L. B. BANGS and D. W. PEABODY

Research Division,
Goodyear Tire & Rubber Co.,
Akron, Ohio

► A study was undertaken to investigate the effects of high energy radiation on natural rubber latex and to explore the possibilities of using radiation advantageously in latex technology. Cobalt-60 gamma rays were used and doses of from one to twenty megarads were employed.

Irradiation improved the storage property of the latex. This was particularly significant with deammoniated latex. As the dose increased, the latex darkened. Properties of the irradiated latex were studied.

Foam rubber produced from irradiated latex exhibited improved compression and stock efficiency. Tensile strength and elongation were slightly decreased and volume shrinkage of molded foam stock was increased. The threshold dose for observing such changes was about one megarad.

Several additives, such as a chlorinated solvent, acrylonitrile, methyl methacrylate, and a high styrene resin latex improved the compression of foam rubber when added to the natural rubber latex prior to irradiation.

Extrusion flow properties of rubber made from irradiated latex approached those obtained from "easy processing" rubber.

Irradiation of latex provides a practical method of altering the natural rubber polymer so that it has improved properties for several commercial applications.

Natural rubber latex irradiation treatments could be accomplished on a commercial scale through the use of currently available radiation generating sources, either electron accelerating machines or radioactive isotopes. Preliminary cost estimates on latex foam applications indicate that a 1 Mr dose is more attractive from an economic standpoint than is a higher dose.

Although the results depicted in this report are based on preserved, concentrated latex it is reasonable to assume that comparable data would be obtained using fresh natural latex, which would be preferred. This would permit the irradiation to be done at the plantation site and allow several different products (concentrated latex, improved extruding rubber, etc.) to be made using the same facility.

MANY publications describing the effects of ionizing radiation on materials have appeared in the technical literature. Both beneficial and deleterious changes have been noted. Irradiation induces both scission and cross-linking in polymers *(7), (21).* Radiation can be used *(a)* to cross-link polymers *(6), (9), (19), (32), (10); (b),* to catalyze the polymerization of monomers *(8), (11), (1), (23), (4); (c),* to initiate the grafting of monomers to polymers *(14), (15), (28), (33), (13), (34), (31), (22), (3), (16), (5), (17);* and *(d),* to sterilize foodstuffs, pharmaceuticals, and the like *(36).* It is known that low concentrations of chemical additives will frequently render a system more sensitive to such radiation effects *(18), (26), (35), (25).* Moreover, enhanced radiation effects on solutes have been demonstrated as a result of energy transfer from solvent-radiation interactions *(2, 12).* The irradiation of latex offers a virgin field of exploration, as judged by the paucity of literature relating to this subject. Inasmuch as latex seems to be particularly amenable to all of the types of radiation-induced reactions which have been mentioned, we undertook this study as a means of

Note: This paper was presented at the International Conference on Natural Rubber Research, Kuala Lumpur, Malaya, September 26 to October 1, 1960.

TABLE I—LATEX PROPERTIES

	Radiation Dose, Mr				
	0	1	2	5	20
Total Solids (%)	62.5	62.5	62.5	62.5	62.5
Total Alkalinity (% NH_3 on H_2O)	0.58	0.57	0.57	0.59	0.56
pH	9.90	9.88	9.92	9.94	9.82
KOH No.	0.567	0.624	0.667	0.670	0.739
VFA No.	0.0550	0.0567	0.0560	0.0535	0.0545
Viscosity, (Brookfield) 30 RPM					
cps at 60% TSC	60	60	52	56	67
cps at 50% TSC	14	14	14	14	15
Surface Tension (dynes/cm.)	35.1	35.6	35.7	36.4	37.9
Turbidity	4.5	4.2	4.5	4.2	4.3
Color	White	White	Sl Off-White	Light Tan	Light Brown
Density (gm/ml)	0.9400	0.9399	0.9396	0.9413	0.9401

TABLE II—PROPERTIES OF EVAPORATED LATEX FILMS

	Radiation Dose, Mr				
	0	1	2	5	20
Gel Content (%)	6.8	66.9	69.5	91.7	100.0
Water Extract (%)	0.5	0.7	0.6	1.1	1.7
Acetone Extract (%)	3.3	3.2	3.2	3.2	3.0
Nitrogen Content (%)					
H_2O Extracted films	0.29	0.27	0.26	0.25	0.22
Unextracted films	0.34	0.35	0.35	0.35	0.35
Swell Index (Wt. C_6H_6 per Unit Wt. polymer)	388	45	38	15	10
Specific Gravity	0.9163	0.9197	0.9196	0.9197	0.9199

TABLE III—GELLED LATEX FILMS
(Compounded and Cured)

	Radiation Dose, Mr				
	0	1	2	5	20
Tensile (psi)					
50% Elong	105	120	120	125	140
100% Elong.	130	175	170	170	210
150% Elong.	186	205	230	235	270
200% Elong.	213	275	300	310	350
Ultimate Tensile Strength (psi)	6190	5820	6600	5350	3800
Ultimate Elong. (%)	800	780	750	710	625

extending to latex technology the unique benefits and promising applications which have evolved in other fields as interest in radiation has gained momentum.

Procedure

Latex. The natural rubber latex used in this work was obtained from The Goodyear Sumatra Plantations Company, Wingfoot Estate, Sumatra, Indonesia, of bud grafted *Hevea Brasiliensis* trees of standard eastern clones planted in the early part of 1930. The latex is a centrifuge concentrated low ammonia type preserved with 0.60 per cent ammonia based on the serum phase.

Irradiation. All latex samples were irradiated with Co^{60} gamma rays while contained in glass jars at an ambient temperature of 65°F. The quantities irradiated in one container varied anywhere from one pint to two gallons. Sample containers were closed with screw cap type lids, and no effort was made to remove air from the latex or exclude it from above the latex surface. Dosage rates of from 0.03 to 0.34 megarad/hour were employed for the irradiation treatments.

In order to improve the uniformity of the radiation dose delivered to each latex sample during the exposure period, either continuous or intermittent mixing was used, the choice being dictated by both the intensity of the radiation flux incident upon the sample and the magnitude of the dosage gradient existing throughout the specimen.

Evaluation. The American Society for Testing Materials (ASTM D1076-56) methods were used for obtaining the major latex properties. The gelled latex films and the foam rubber samples were made using the following base formula:

Materials		Parts Dry
(1) Natural Rubber	(62.6%)	100.00
(2) Sulfur	(60.0%)	2.25
(3) Zinc diethyldithiocarbamate	(50%)	0.50
(4) Zinc mercaptobenzothiazole	(45%)	1.50
(5) Wing-Stay S Antioxidant	(57%)	1.00
(6) Zinc oxide	(50%)	3.00
(7) Diphenyl guanidine	(30%)	0.60

Materials 2, 3, 4, and 5 were added to item 1 and allowed to mature 24 hours. When preparing films, items 6 and 7 were added just prior to the gelant. When making foam they were added after frothing and immediately prior to the gelant addition. The gelant was a 25 per cent dispersion of Na_2SiF_6.

For frothing, a potassium tall oil soap, consisting of 70 per cent rosin acid and 30 per cent of a mixture of oleic and linoleic fatty acids, was used in sufficient quantity to produce a stable froth in a minimum time. Approximately 6 cc of a 20 per cent soap solution per 100 grams of rubber were required.

The latex and latex-additive blends were irradiated prior to compounding.

Standard ASTM Tests

The standard ASTM tests for cellular rubber products (D1056-59T) were used wherever practical for evaluating the foam rubber specimens. The oxygen absorption technique for determining long term aging of foam rubber is a fairly common and acceptable method *(29)*.

The acetone rinse of the foam specimens, which have already been tested for compression set, is a method which we have developed to differentiate between cell wall tack and degree of undercure in as much as both may result in high compression set properties. Obviously, if the compression set is due to

cell wall tack a lubricating agent such as paraffin, oil, etc. may be used to overcome it.

The formula used for the gum vulcanizates was:

Rubber	100.0
Zinc oxide	5.0
Sulfur	3.0
Stearic Acid	1.0
Mercaptobenzothiazole	1.0
Phenyl beta napthylamine	1.0

The rubber was press cured for 20 minutes @ 287°F.

Results

Table I shows the effect of gamma radiation on natural latex properties. The KOH number increases substantially which indicates that irradiation induces the decomposition of the protein, soaps, esters, and similar ingredients which are present in natural latex. This change is further indicated by the increase in surface tension and the darkening of the latex serum.

The data in Table II indicate radiation initiated cross-link formation within the polymer, i.e. gel content increases and swell index decreases, with cumulative radiation dose. A moderate dosage of one megarad (Mr) is sufficient to yield a very substantial increase in gel content. The increase in water extractables of the evaporated latex films with increased irradiation tends to substantiate the theory that a degradative change occurs in the non-rubber ingredients. The decreasing quantity of nitrogen in the water extracted films indicates that the protein is undergoing chain scission with a resultant increase in water soluble compounds of low molecular weight.

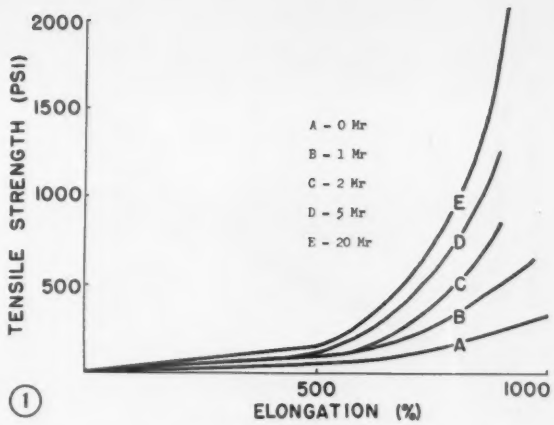
The stress-strain values of evaporated latex films (uncompounded) show that radiation cross-linking of the polymer leads to increased modulus and substantially higher tensile strength (Figure 1).

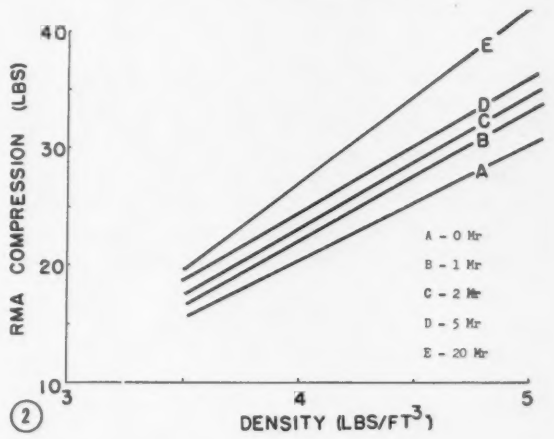
For foam rubber applications the moduli of gelled latex films (Table III) at 50 per cent and 100 per cent elongation are very important, and higher moduli at these elongations usually translates into higher foam stock efficiency. Ultimate tensile and ultimate elongation decrease as the irradiation increases, this being a further indication of a more tightly cured and crosslinked polymer.

Figure 2 shows a progressive improvement in the compression-density ratio of foam rubber cushion stock as the radiation dose accumulated by the latex increases from 0 to 20 Mr.

Figure 3 indicates the percent savings in stock obtained with increased irradiation of the polymer. These data, calculated on the basis of a foam rubber cushion of 25 pounds RMA compression, show that 6 per cent less rubber is required for an equivalent foam when the latex is given a 2 Mr treatment. Twelve per cent less rubber is needed if a 20 Mr treatment is used.

Irradiation of natural rubber latex affects other important properties of foam rubber (Table IV). With increased radiation dose the stress-strain values of the foam decrease and the shrinkage increases. Permanent set properties appear to be seriously impaired with irradiation. However, after the foam





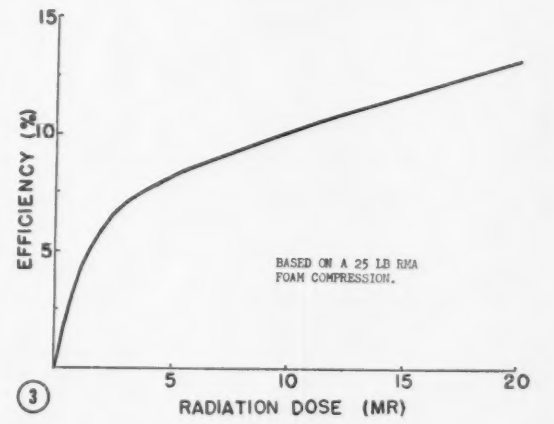


FIG. 1—Stress-strain values of evaporated latex film; FIG. 2—Compression-density values of foam rubber, and FIG. 3—Foam rubber stock efficiency.

specimens are rinsed in acetone they recover, indicating that cell-wall surface tack is the factor rather than state of cure. There is very little effect on the aging properties of foam rubber made with irradiated latex (Figure 4).

The effect on the compression-density of foam rubber of chemical additives contained in natural

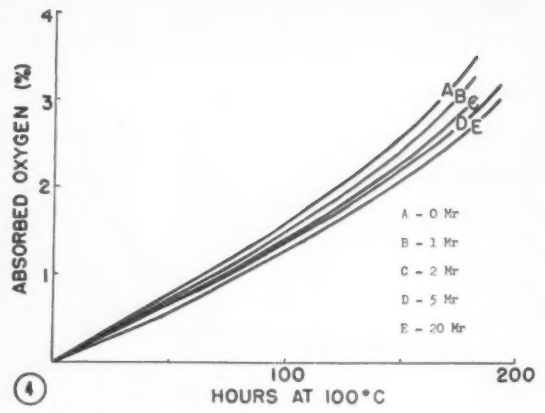


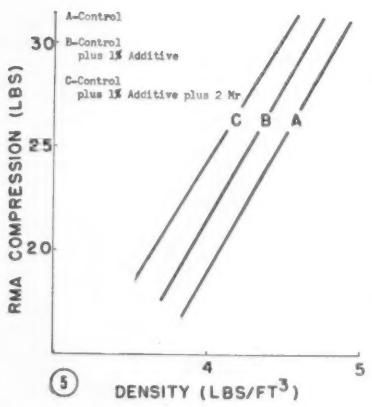
FIG. 4—Effect of irradiation on aging values of foam rubber.

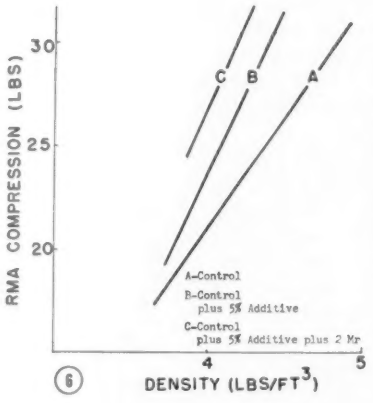
rubber latex during irradiation is shown in Figures 5, 6, 7, 8, and 9. High styrene resin latex *(20)* has the most pronounced effect on increasing foam modulus and methyl methacrylate is next in value.

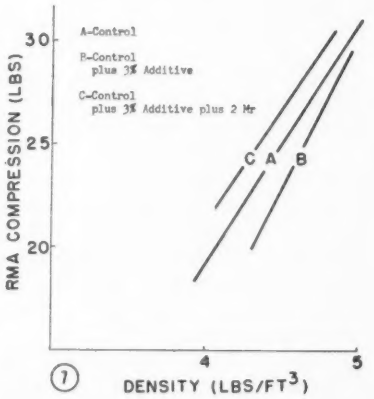
This approach allows us to reduce the rubber content of a 25 RMA compression foam by some 11 per cent if 5 per cent Pliolite 151 is blended with the latex prior to a 2 Mr exposure or about 7 per cent if 1 per cent methyl methacrylate is used. When these are compared with the 6 per cent improvement noted in the case of straight latex exposed to this dose, it is apparent that the additives promote the desired result. Here again it may be hoped that other additive concentration-radiation dose combinations may yield even higher foam rubber stock efficiencies. The optimum treatment must be judged on the basis of the benefits obtained.

Rubber was acid coagulated from the irradiated latices and, during milling, it was observed that the irradiated polymers had lower memory and resembled superior processing rubber in this respect. A sufficient quantity of the polymers was unavailable for exhaustive evaluation but extrusion properties of the 20 Mr gum stock show it to be greatly superior to the control.

Figure 10 shows Garvey die extrusions comparing non-irradiated gum stock, a blend of 75 per cent RSS No. 1 and 25 per cent 20 Mr gum stocks, and a blend of 75 per cent RSS No. 1 and 25 per cent PA80 stock. The PA80 is an 80-cross-linked-rubber —20-regular-rubber blend made by coagulating a blend of the two latices and drying the coagulum. The cross-linked rubber is made by prevulcanizing the rubber while still in the latex form. The Rubber Research Institute of Malaya developed this very







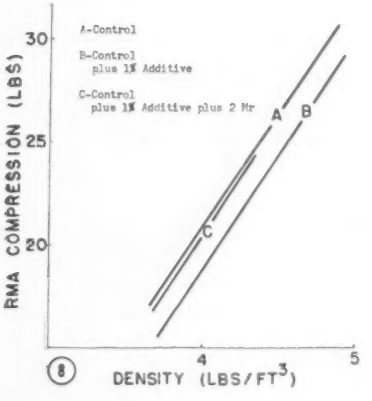


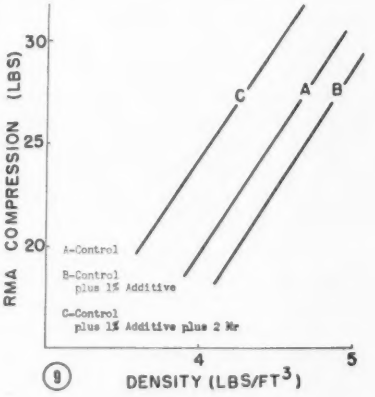
FIG. 5—Combined effect of methyl methacrylate and irradiation on compression-density values.

FIG. 6—Combined effect of high styrene resin and irradiation on compression-density values.

FIG. 7—Combined effect of colloidal silica and irradiation on compression-density values.

FIG. 8—Combined effect of acrylonitrile and irradiation on compression-density values.

FIG. 9—Effect of a chlorinated solvent and irradiation on compression-density values.



worthwhile product for improving the extruding characteristics of rubber *(30)*.

Another test using the Olsen Flow apparatus shows the correlation between gel content and extrusion rate (Figure 11). As one would expect, the addition of cross-links markedly increases resistance to plastic flow.

Stress-strain values of gum vulcanizates made from irradiated latices are approximately equivalent in the lower dose range, but at 20 Mr the increase in modulus is quite apparent (Figure 12). The lower section of this graph (Figure 12), from 50 per cent elongation to 300 per cent elongation, is magnified in Figure 13 to emphasize the response of moduli to irradiation.

Figure 14 shows the increase in ultimate tensile strength resulting from increased irradiation. This is contrary to the results which have been found for synthetic latices *(24)*. Since optimum curing conditions were used for the unirradiated control, irradiation apparently has modified the fundamental molecular structure in such a manner that the polymer develops superior load bearing properties. If this can be carried over into reinforced natural vulcanizates, it holds promise for the development of rubbers with superior tensile properties.

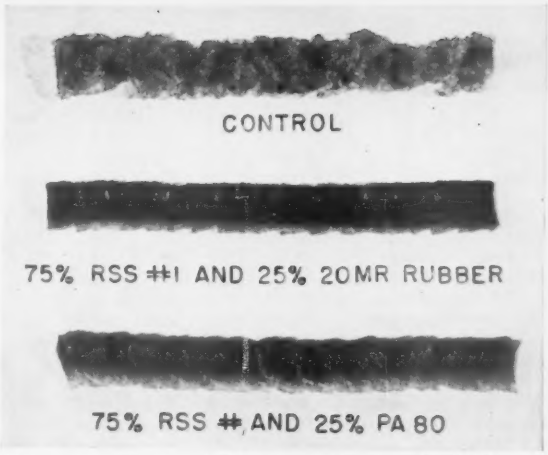
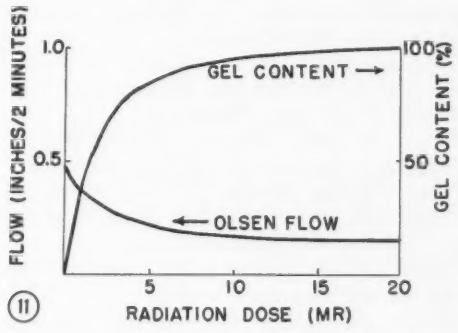
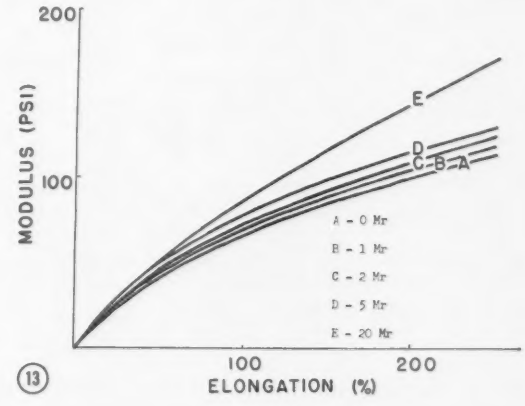
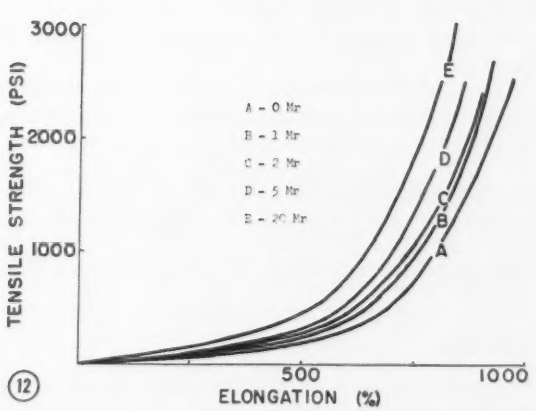


FIG. 10—Garvey die extrusions, comparing a non-irradiated gum stock (control) with two irradiated blends.

Results of irradiation on the storage property of natural rubber latex indicates that it prolongs the life







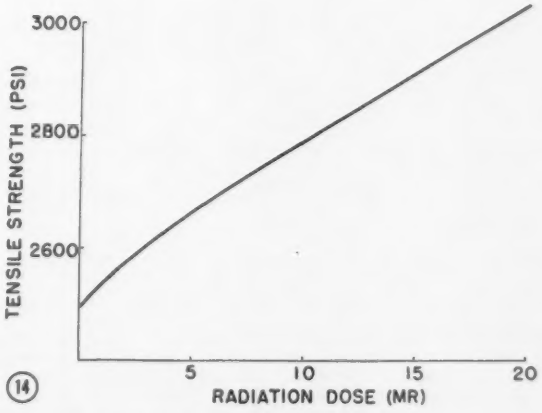


FIG. 11—Olsen flow and gel content of polymers from irradiated latex; FIG. 12—Stress-strain properties of vulcanized gum stock; FIG. 13—Moduli of gum vulcanizates, and FIG. 14—Ultimate tensile strength of gum vulcanizates.

TABLE IV—FOAM RUBBER PROPERTIES
(Core Stock)

	Radiation Dose, Mr				
	0	1	2	5	20
Color	Light Tan	Light Tan	Light Tan	Dark Tan	Brown
Tensile Strength (psi)	13.4	13.3	12.7	11.4	11.3
Elongation (%)	390	340	350	240	240
Volume Shrinkage (%)	18.5	18.8	19.7	24.1	28.6
Permanent Set Test (% Retention of Gauge)					
50% Deflection	93.6	92.6	93.1	91.2	91.5
90% Deflection	58.4	28.2	25.9	32.7	49.6
After Acetone Rinse and Drying					
50% Deflection	95.8	95.6	95.0	94.5	95.0
90% Deflection	92.8	91.5	90.6	90.8	91.8
Oxygen Absorption (Hours Required to take up 3% O_2 @ 100°C.)	166	175	180	184	191

TABLE V—DATA PERTINENT TO A MACHINE IRRADIATION TREATMENT

I. Assume: (a) use of a 2 MEV electron generator with an external beam power of 10 KW, and (b) annual machine operation of 6,000 hours, as in Reference *(27)*.

II. Cost

Capital Costs		
Fixed	$251,100	
Annual (5 year life)		$50,220
Operating Costs		
Direct	$55,500/yr	
Indirect	28,200/yr	
Fixed	57,753/yr	
Annual		$141,453
Total Annual Cost		$191,673

III Capacity: at 100 per cent utilization of the beam power and under the above assumptions this machine has a capacity of 47,580,000 megarad-pounds per year.

TABLE VI—ECONOMIES OF FOAM PRODUCTION FROM IRRADIATED LATEX

	Cost of 25 lbs., RMA Compression Foam* ($ per cubic foot)		
	Regular Latex	Latex Exposed to 1 Mr	Latex with 5% Pliolite 151 Exposed to 2 Mr
Materials Cost			
Rubber Polymer	$1.98	$1.89	$1.67
Pliolite Resin 151	—	—	.055
Irradiation Cost	—	0.071	.1625
Total Cost	1.98	1.96	1.89
Relative Cost	100%	99%	95%

* Based on following assumptions: (a) total annual cost from Table V, (b) machine is used with an over-all processing efficiency of 40 per cent, (c) natural latex contained 60 per cent rubber and costs 45c per pound of dry rubber, (d) Pliolite 151 latex contains 53 per cent solids and costs 29.5c per pound of dry polymer in tank car lots.

of the latex. In order to accelerate this test the latex was deammoniated and then subjected to 6 Mr of radiation. Although the KOH number increased initially over that of the control it did not go up on further aging. After four months time the control developed a putrid odor whereas the irradiated sample had little or no odor.

Commercial Possibilities

Natural rubber latex irradiation treatments could probably be accomplished economically on a commercial scale. Either electron accelerating machines or radioactive isotopes could be used as the source of radiation. Preliminary cost estimates for both a 2 MEV machine source and a separated fission product source (Zr_{95}-Nb_{95}) are quite attractive.

A résumé of our estimate for a machine is illustrated in Table V. Note that a 2 MEV, 10 KW beam-out unit when operated 6,000 hours per year can process about 48 million megarad-pounds of material at an annual cost of less than $200,000. This assumes 100 per cent utilization of the radiation stemming from the machine.

In considering the economics of latex irradiation (Table VI), we have chosen 40 per cent as a realistic over-all processing efficiency for the machine. Solely on the basis of improved load bearing properties of foam, one finds that the materials cost can be reduced *(a)* 1 per cent by using a natural latex exposed to 1 Mr, and *(b)* 4.5 per cent through use of a latex containing 5 per cent Pliolite 151 which has been given a 2 Mr dose. Though such other benefits as sterilization of latex, improved processing of dry rubber, and enhanced physical properties of vulcanizates certainly have some economic value, they were ignored in computing these costs.

Figure 15 was prepared from data in Figure 3 by the method illustrated in Table VI. A 1 Mr dose appears to yield a minimum cost product. This plot offers little incentive for undertaking the irradiation of natural latex strictly for foam improvement. However, it is encouraging to note that the latex-resin blend of Table VI shows a relative cost reduction of 4.5 per cent at 2 Mr. Natural based blends may be even more competitive with synthetics at higher resin contents.

We have not established the resin content-radiation dose combination yielding optimum foam stiffening. In this connection, it is interesting to note that Pliolite 151 is frequently used in synthetic latex in quantities greater than 5 per cent for foam application. There is also a distinct possibility that enhanced effects may be found when fresh latex is used in place of the stabilized latex with which we conducted our experiments.

Conclusions

Irradiation of natural rubber latex increases the KOH number but at the same time decreases the tendency of the latex to develop putrefaction. Besides effecting a cross-linking of the rubber polymer,

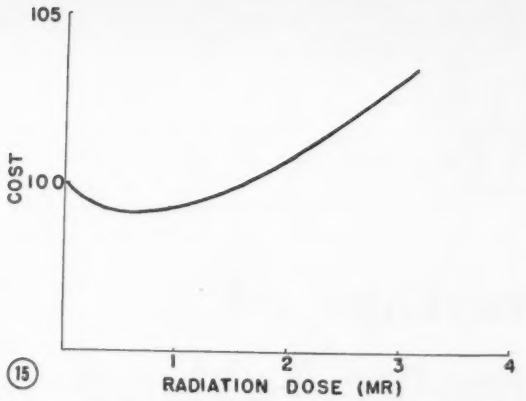


FIG. 15—Relative cost of foam rubber prepared from irradiated latex.

as measured by gel content, irradiation appears to result in a chemical breakdown of the organic non-rubber complexes contained in the latex as measured by the KOH number.

Foam rubber made from irradiated latex exhibits higher compression values and this is accompanied by lower stress-strain values. The irradiated latex results in greater volume shrinkage of foam rubber which may be due to a more abrupt gel condition occasioned by the destruction of the naturally occurring stabilizers.

Load Bearing Qualities

Foams made from irradiated latices exhibited equivalent load bearing qualities at reduced rubber content. Such improvement increases with the cumulative radiation dose and is enhanced by the presence of high styrene latex resin.

► A point of diminishing returns may be reached when larger doses are used due to the cost of the radiation treatment.

► Rubber from irradiated latex has flow properties approaching those of blends of superior processing rubber.

► Gum vulcanizates with improved tensile strength have been prepared from irradiated latices.

► Aging values of natural rubber vulcanizates are not adversely affected by irradiating the latex.

► Irradiation of latex provides a practical and economical method of altering the natural rubber polymer so that it has improved properties for several commercial applications.

Obviously, if irradiation of natural rubber latex were to be done commercially, it may be more desirable to do it on the fresh latex. This would, of course, necessitate an installation on the plantation. Although the work described in the report concerns a concentrated and preserved latex we think the results will be comparable to those obtained when fresh latex of lower total solids is used *(14)*.

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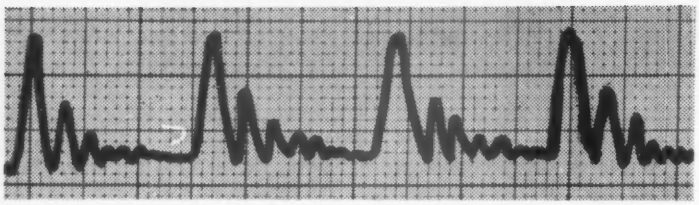

The Automation of Goodrich Flexometer Testing

By A. F. CODY

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THE Goodrich Flexometer has proven to be a very useful tool for the rubber compounder since its introduction more than 20 years ago. As developed by Lessig *(1)*, it measures the effect of high frequency compression on a cured cylinder of rubber. This is an important parameter to be considered when defining the characteristics of rubber compounds which are likely to see dynamic service under compressive loads.

This test is relatively expensive and time-consuming because the height and temperature of the rubber sample change constantly during the test, and the full attention of a skilled operator is required to maintain balance in the equipment.

The purpose of the work reported here was to automate the Goodrich Flexometer so that the maximum amount of data could be measured and recorded with the minimum consumption of an operator's time.

The conditions of this test are not rigidly specified by ASTM Standard D-623-58. Considerations such as test duration, length of compression stroke, and applied load on the sample can be varied depending on the information desired as well as the type of rubber stock being tested. To gain a real measure of the dynamic properties of a stock under conditions close to those expected in service, it is often necessary to test the sample for extended periods under medium to light loads.

With the automatic equipment described in this paper, it requires only four minutes of an operator's time to complete the test regardless of the test duration. This is possible because the operator can leave the machine unattended until the conclusion of the test as soon as he has measured the static compression and started the dynamic testing. The modifications discussed provide, in addition, a complete and permanent record of the compression and temperature changes which take place during the test. In a manual operation, however, it is necessary for the operator to attend the machine and continuously rebalance the equipment throughout the test to follow the effects of compression on the sample.

Test Equipment

In the Goodrich Flexometer test a definite compressive load is applied to a test specimen through a lever system having high inertia, while imposing on the specimen an additional high frequency cyclic compression of definite amplitude. Because of the high inertia and low natural period of the lever system, practically none of the high frequency vibration is transmitted to the loading beam although this beam does move in order to compensate for slow changes in the sample caused by compression set.

The essential parts of the machine are illustrated in Figure 1. The low frequency system consists of

Summary

► The Goodrich Flexometer has been instrumented to operate automatically and measure and record all the significant parameters with a minimum of operator attention. When the automated test is completed, the changes in compression and temperature have been fully recorded and are available for permanent records. With the instrumentation used, the test can be run to completion with only four minutes of the operator's time, regardless of the test duration. In contrast, the standard manual procedure requires the constant attention of the operator throughout the test. Controlled tests showed that these modifications had no adverse effects on the accuracy and precision of the results.

This paper was presented at the Fall Meeting of the Division of Rubber Chemistry, American Chemical Society, New York, N. Y., September 16, 1960.

a horizontal beam balanced at the center on a knife-edge with 50-pound inertia weights suspended from each end at points equidistant from the knife-edge. On the arm towards the operator at a distance about halfway between the knife-edge and the weight, an anvil is attached to the beam. This anvil is movable in a vertical direction by means of a micrometer device attached to the end of the beam.

The test piece is held between this anvil and a hammer that is rigidly attached through guide bearings to an adjustable eccentric which is driven at 1800 rpm. During start-up, the balance beam is held in place by a steel retaining pin to prevent undue movement of the system during the lower speed cycles. The desired load is applied to the sample by adding weights to the end of the bar opposite the sample. Both the load and the length of the compression stroke delivered by the hammer are varied depending on the type of rubber being tested and the type of service for which it is designed.

The two most significant changes which occur in a rubber sample during dynamic testing are compression and heat build-up. To measure the compression changes as they take place, it is necessary to return the balance beam to the level position. This is done by raising the anvil on which the sample rests to compensate for the reduced sample height.

It is important to do this throughout the test because it is often necessary to know the rate and extent of change in compression when comparing different rubber compounds. This constant leveling posed the main problem to the automation of the test since it required the development of a method for the continuous, accurate releveling of the beam without reducing the sensitivity gained from the knife-edge balance.

To obtain maximum accuracy, any sensing device has to be placed at the end of the balance beam. A small amount of friction introduced at this point in the system will be critical because it will be greatly magnified by the distance at which it occurs from the knife-edge balance point. This can significantly hinder the movement of the beam and slow the response of the entire system. A sensing device which does not have to make physical contact when completing or breaking the circuit is necessary to meet this requirement.

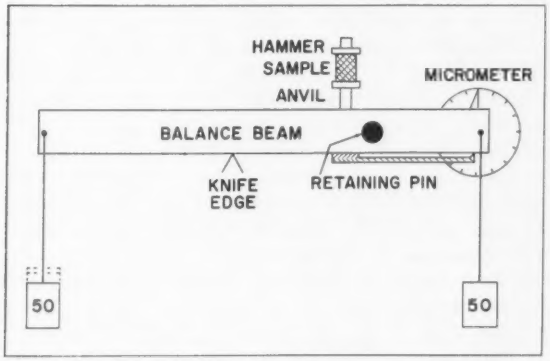

FIG. 1—The essential parts of the Goodrich Flexometer.

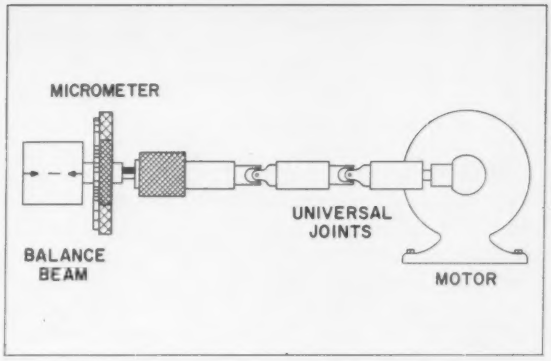

FIG. 2—Drive mechanism for the leveling system developed to provide continuous, accurate releveling of the balance beam. Shaft fitted with two universal joints provides flexibility without drag.

The device used to obtain this type of circuitry was a Proximity Pickup Control Unit. This detecting device can sense the position of a metal blade protruding from the far end of the balance beam into an electromagnetic field. The unit employed is an accurate position indicator with a position repeatability of ± 0.001-inch and, since no contact occurs at any point, it gives friction-free control. No lag in response of the system was found which could be attributed to this unit.

The drive mechanism for the leveling system is shown in Figure 2. This consists of a reversible 1/50 horsepower gear head reduction motor connected through a flexible drive shaft to the micrometer adjustment mechanism which is used to raise or lower the sample-holding anvil.

Because the drive shaft is connected at one end of the balance beam, it can apply a significant drag to the system if not properly constructed. The shaft developed for this mechanism is fitted with two universal joints. This provides the necessary flexibility in the shaft which acts as an additional weight to the beam and not as a point of friction. This extra weight is readily offset by the addition of an equal amount to the other end of the beam.

A spring-loaded clutch arrangement has been designed to connect the drive shaft and the micrometer dial. This can be disconnected at any time by pulling back on the drive shaft against the spring.

The sensitivity of the balance beam was checked before and after it was fitted with the automatic equipment. In both cases, it required the addition of only 10 grams to be displaced from the level position. Therefore, it was concluded that the added mechanisms did not affect the sensitivity of the beam.

Rebalancing Circuit

The circuitry is not only designed to make the entire dynamic operation automatic, but also includes provisions for measuring the initial static compression with the automatic equipment. The dynamic test

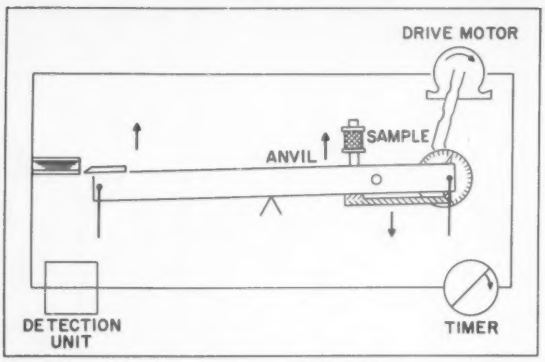

FIG. 3—Dynamic test circuit makes operation automatic, and also provides for measuring the initial static compression of the sample.

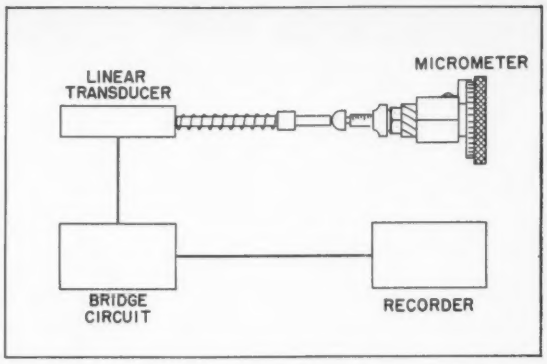

FIG. 4—Dynamic compression recording unit is an adaptation of manual equipment to measure changes in height automatically.

circuit is shown in Figure 3 and includes the level-sensing device, a timer, and the drive mechanism. It was designed to start the drive motor when two conditions are fulfilled: first, the timer which actuates the circuit has to close; and, at the same time, the beam must be off level. These conditions close the circuit through the level-sensing unit.

The timer was designed to complete the circuit at predetermined intervals of 12 seconds. Once the circuit is completed by the timer, it remains intact until it is broken by the return of the beam to the level point. While the circuit is closed, the drive mechanism raises the anvil on which the sample rests, to compensate for the decreased sample height which occurs during flexing. This lowers the forward arm of the balance bar until the necessary correction has been made.

At the level point, the metal blade attached to the back of the beam reenters the electromagnetic field and causes the detecting unit to break the circuit, thereby deactivating the drive motor. The circuit is then opened at both the sensing unit and the timer. If the beam has not moved away from the level point when the timer closes its portion of the circuit, there can be no activation of the drive motor and the timer circuit reopens immediately.

In practice, the drive motor was always found to override the end point by 0.002-inch, but this was readily compensated for in the initial calibration of the level point.

Recording System

Another phase of the problem was the constant measurement and recording of the change in sample height during the test. The leveling circuit assures that the balance beam is checked at 12-second intervals and readjusted if necessary. To determine what happens to the sample during the test, however, the changes have to be recorded each time the circuit is activated. This was accomplished by adapting the manual equipment for measuring the changes in sample height to a device which would measure these changes automatically.

In the manual operation of the flexometer, changes in sample height are measured by a micrometer device geared to the sample-holding anvil. As the height of the anvil is raised, a micrometer arm, calibrated in 0.025-inch, advances from the gears. This is supplemented by a vernier on the adjustment dial which reads to 0.001-inch and covers the range from 0 to 25. Automatic measurement was obtained by placing a linear transducer contiguous to the end of the micrometer arm as shown in Figure 4. With the transducer in this position, the advance of the micrometer arm changes the output of the transducer proportionately as the anvil is raised. This change is measured and registered on a potentiometer recorder and, changes in compression, as measured against time, can be read directly from a strip chart.

The measurement of temperature changes in the sample during testing is standard practice. A thermocouple in the center of the anvil is a standard component of the Goodrich Flexometer and, for convenience, most laboratories attach it to a recorder. This produces a graphic record of the temperature changes which take place in the sample during the test.

These two recordings provide a full description of what has taken place during a test without additional effort on the part of the operator.

One final consideration is necessary to eliminate the need for operator attention. This is the proper placement of safety switches to prevent any mishap from occurring to the unattended machine whether from malfunction or sample deterioration.

Three microswitches located above and below the rear section of the balance beam are positioned so that they will be actuated only by an extreme displacement of the beam. One switch, located above the beam, deactivates the drive motor if the balance-sensing unit fails to stop it. This override safety switch does not shut down the test completely since valid measurements of temperature rise and compression set can still be obtained with the sample under test even though the sensing device has failed. By reversing the drive motor and manually releasing the microswitch the test can be continued without interruption if this is the only switch that has been tripped.

The other two switches are located below the beam to shut down the entire mechanism in the event of a

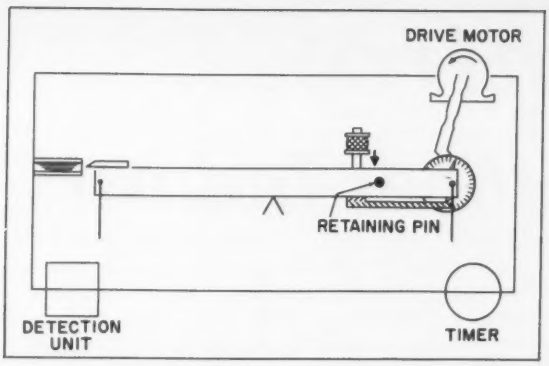

FIG. 5—Static test circuit shows reversal of motor and rebalancing circuit, with retaining pin in balance beam at start of test.

sample blowout. One switch is connected to the leveling drive motor; the other to the flexometer motor proper. Once these switches are actuated the equipment will not operate until the reset buttons are pressed.

Test Procedure

Testing with a Goodrich Flexometer automated in the above fashion would proceed as follows:

The static compression of a test specimen is obtained at the start of a test with the circuit in the normal operating position. After the sample is in place and the retaining pin has been removed, the automatic equipment is used to relevel the static beam. However, the sample is always compressed further under static load than it is under the initial dynamic forces, because the dynamic modulus is always greater than the static modulus. Therefore, before dynamic testing can begin, it is necessary to allow the sample to expand until it is slightly larger than it will be in the initial stages of the dynamic test. This is accomplished with the automatic mechanism by replacing the retaining pin in the balance beam and reversing both the motor and rebalancing circuit as shown in Figure 5.

Now, the sensing unit actuates rather than stops the motor while the beam is at balance, and the beam has to remain at balance because of the retaining pin. Only the height of the anvil under the sample can change. The anvil can be lowered in this fashion on the secured beam until the desired sample height is reached. Then, the motor and sensing unit circuits are returned to their normal positions and the equipment is ready for dynamic testing. Once the dynamic testing begins, the operator is released from the test until the end when he is ready to stop the machine and remove the sample.

TABLE I—AUTOMATIC VERSUS MANUAL TESTING

	Manual		Automatic	
	Avg. Val.	Std. Dev.	Avg. Val.	Std. Dev.
Temperature Rise, °F.	34.0	± 2.6	33.8	± 1.3
Static Comp., Inches	0.237	±0.006	0.232	±0.011
Permanent Set, %	13.3	± 0.46	13.3	± 0.44

Test Results

The ability of the automated flexometer to duplicate results obtained with a flexometer operated manually was established by a series of tests run on sixteen test specimens prepared from a single butyl rubber tire compound. Both the accuracy and the precision of the two methods of operation were determined from the test results. Eight samples were tested manually and eight identical samples were tested automatically. All tests were run by the same operator. The test conditions employed included a 15-pound load, ¼-inch stroke, an ambient temperature of 212°F., and a test duration of 30 minutes.

The average measurements and standard deviations obtained in both operations are shown in Table I. The agreement between the results from the two operations is good. The average temperature rise checks within 0.2-degree. The static compression agrees within 5 points in 230, and the permanent set values compare to the 0.1 per cent.

The standard deviation was calculated for each value and is given as a measure of the precision obtained in the test. Both methods demonstrated a high degree of precision and the data indicate equivalent performance between the two.

Conclusions

The Goodrich Flexometer has been instrumented to operate automatically, and measure and record all the significant parameters with a minimum of operator attention. With the instrumentation described, the test requires only four minutes of the operator's time regardless of the duration of the test. When the automated test is completed, the changes in compression and temperature are fully recorded and available for a permanent record.

This automation requires seven relatively simple additions to the standard equipment:

(1) A proximity control unit which gives friction-free control to the rebalancing circuit.

(2) A 1/50 h.p. reversible motor which supplies the power to raise or lower the anvil under the sample.

(3) A flexible drive shaft to transmit the power from the motor to the balance beam without creating a drag on the system.

(4) A timer to actuate the circuit.

(5) A linear transducer and a potentiometer recorder for the measurement and recording of compression changes in the sample during test.

(6) A temperature recorder to register the temperature changes which occur in the sample.

(7) Three safety switches for the protection of the unattended machine.

These modifications were shown to have been made without adverse effect on the accuracy and precision of the Goodrich Flexometer as previously designed.

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Quality Control in the Rubber Industry

PART 0 | 1 | 2 | 3 | 4 | 5

STATISTICS

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THERE is probably no single area of modern quality controlling methods that has received as much publicity as statistical techniques. As a result, there is sometimes confusion between the over-all concepts of modern quality control and its statistical portions. Actually, there are many important techniques of scientific control of quality, such as instrumentation, automatic or improved inspection, and non-destructive testing, which have no direct connection with statistical quality control (SQC). In addition, the general methods of quality control organization, definition of functions, procedures and specifications, good personnel selection and training, apply equally to SQC and to other control methods.

As a matter of fact, sometimes the statistical and the engineering methods are competitive. The QC manager may have a choice between sampling and carefully designed 100 per cent inspection, or between use of a Shewhart control chart versus use of automated process control.

However, although they disagree with the opinion that SQC is the sum and substance of modern quality control, the writers consider the basic ideology of SQC essential to economical quality control and the techniques of SQC important in many areas of rubber manufacture. Those who believe that "statistical control is not suited to my business" have usually an inadequate knowledge of these methods, or in some instances, insufficient facts concerning their own losses or present test and inspection errors.

What Are Statistics?

Actually in the broad sense, statistics are simply numerical evaluations, as opposed to descriptions in words. We might say something is "very hard," or we might say it has a durometer of 85. Both of these statements compare the item to some standard; but in one case the standard is an indefinite mental one, in the other case there is a more definite and reproducible standard.

We all tend to use statistics when we have facts, and to use verbal descriptions when we have no real data (or when the data do not agree with our opinions!). Since numerical facts carry more weight, some persons, and companies, have tended to use inaccurate, incomplete, or irrelevant statistics to convince others. This continues to give "statistics" a bad reputation. It is not that more liars use statistics. It is that statistical liars tend to be more convincing! Perhaps everyone needs to learn some elements of statistics if for no other reason than to ignore claims of products reputed to be "65 per cent smoother," "preferred by 7 out of 9," or "proven 3½ times as effective"!

Seriously, the statistics of quality control, like those of research, should be numerical *facts,* collected and analyzed accurately and impartially, not to sell opinions, but to enable decisions to be soundly based on knowledge.

What Is SQC?

In a broad sense, statistical quality control is the use of numerical data to aid in the control of quality. A good start toward a program of quality control is the simple process of finding answers, in accurate numbers, to these questions: "What variations do we have?" "How many defects, and of what kinds?" "Is there a difference between shifts?"

However, SQC is much more than simply using numerical facts. It is a system or group of methods for *collecting* and *evaluating* numerical facts for the economical control of materials, processes and

This article, third in a series of five, discusses statistical methods—including routine control, experimentation, trouble shooting, evaluation and effective use—for economical maintenance of product quality

products. SQC generally differs from older systems of inspection and tests in several ways:

(1) SQC aims at preventing defects, rather than catching them after production.

(2) SQC does not attempt perfect quality, but aims at maintaining satisfactory quality with required reliability. (This may be a higher level of quality than previously less scientific attempts to be "perfect.")

(3) SQC is very much concerned with costs and with aiding the company to operate at the quality level offering best long-range profit and expansion.

(4) SQC uses sound mathematical principles to determine logical specifications, to adjust processes, to evaluate lots of material or product, and to investigate quality problems. This is done by analysis of statistical facts, rather than depending on guesses, inadequate (or excessive) data, or rules-of-thumb.

SQC is *not* sampling (although scientific sampling is one of its many techniques).

SQC is *not* limited to high volume mass production nor to "controlled" processes. Those who object to SQC because they "can't use samples," have "too small volume or frequent product changes," or "too many uncontrollable process variations," are unfamiliar with its concepts and techniques, and may well find SQC of special help in their problems.

History of SQC

The histories of both statistics, and of attempts to produce better products, go back for centuries. However, SQC as we know it started in 1931 with W. A. Shewhart's book *Economic Control of Quality of Manufactured Products (1).* There were very few companies which actually used his methods until, in 1942, the War Production Board initiated training classes in elementary SQC for industrial employees throughout the country. In 1946, the American Society for Quality Control (which largely limits itself to statistical aspects of quality controlling) was formed, principally from such War Production Board class members, and in the past 14 years ASQC has done much to further the use of these techniques.

Today, there are thousands of factories using at least some portion of SQC, and the ASQC has more than 11,000 members. However, even today, there are many companies which do not use SQC at all, and many others which do not use it effectively. In part this is due to the aforementioned suspicion of "statistics;" in part to the low level of mathematics background or limited training time of many industrial supervisors; and in part to over-zealous applications by men, at several levels of statistical competence, who have at times been more interested in techniques than in practical results.

In addition to the use of SQC to better control production, there have been many applications of SQC methods, plus the development of special statistical techniques, for the more economical and more useful design and interpretation of industrial experiments. These have been especially useful in locating causes for defects and in evaluating new materials, compounds, or processes. Many believe that in the future these uses of SQC may become more important than the process control aspects—particularly as automatic controls and automatic 100 per cent nondestructive testing become more common.

Regardless of partial replacement by automation, there is no doubt that many SQC methods, and its philosophy—control by facts, not opinion—will remain with American industry for the foreseeable future. Those companies which have intelligently applied SQC for the past years continue to gain in quality and in economics of operation. (Savings of 50 per cent or more of scrap costs and inspection labor have been reported by many companies, plus ability to comply with customer requirements previously considered unattainable.) Those who have not explored its potential, or explored it only superficially, will do well to consider SQC very carefully..

Training in SQC

Instruction in detailed methods of statistical quality control is far outside the scope of this brief paper. In the following sections some of the more common SQC methods are outlined. However, these are included to serve only as general background understanding for the executive who is untrained (or who has erroneous concepts of statistical control). There are several excellent texts in SQC, plus numerous books on special or advanced uses of statistics in industry *(1 through 15).* Some of these are listed in the bibliography and are useful for self study. However, the technical executive who wishes a comprehensive understanding of the types and uses of techniques will require a minimum of 30 hours instruction and study.

The engineer or chemist who expects to effectively utilize simple statistical control methods, plus being able to discuss more complex applications with statisticians, will need several times this amount, normally the equivalent of at least two college level courses, plus independent study and practice.

Benefits of such a program are so great that every engineer primarily concerned with control, development, or research should carefully consider such a personal training program. The reader should refer, also, to the general remarks on QC training in Part II of this series.

Many companies have attempted to train inspection and test supervisors or technicians in elementary SQC, with rather low levels of successful use. While it is entirely possible to understand the usefulness of statistical techniques (or even to use some effectively) without a background in higher mathematics, extensive use requires competence in algebra not held by the average high school graduate. Unfortunately, most courses to date require more interest and ability in mathematics than many of those attending possess.

For the moderate-sized rubber company (100 to 500 employees) the writers suggest that the following training be considered:

(1) Indoctrination training in usefulness (and limitations) of SQC for technical and production heads and for all engineers or chemists.

(2) Elementary methods training for one or two

young technical men (normally with equivalent of a technical degree), who have interests in this type of work and who spend appreciable time on control or development problems.

(3) Instruction in arithmetic, records, simple graphs, random sampling, etc., for any inspectors or test technicians whose work requires this activity.

The larger company will normally find it desirable also to have a competent statistician on the staff of the Control or Technical Department, and may well find such a man useful in other areas of production planning, sales forecasting, etc.

Smaller companies (under 100 employees) will find it difficult to use SQC effectively, unless they either have some interested engineer on their staff or can use the services of consultants or a local college on a limited time basis.

Information on training courses in SQC may be obtained from most technical colleges. The American Society for Quality Control will also furnish information, either from its national offices at 161 West Wisconsin Avenue, Milwaukee, Wisc. or from one of the more than 100 local chapters in most large cities and industrial centers.

Statistical Methods for Routine Control

There are many statistical methods useful in routine control of quality. Often the simplest listing of numerical facts, or the plotting of a time graph of per cent rejects, is sufficient to show need or even method of improvement. In some comparatively few instances, very complex statistical methods may require the services of a competent statistician. Most industrial control problems fall somewhere between these extremes. There are three commonly used SQC methods, one or more of which will usually suffice to convert inspections or tests into a useful basis for decision and action. These are:

(*1*) *Frequency distributions:* grouping together like results to better study the process or lot from which the tests are made.

(*2*) *Control charts:* determining need for action by graphical separation of significant change from chance or "normal" variation.

(*3*) *Sampling plans:* to economically determine, with required accuracy, the quality level of some lot or group of product—often with respect to some predetermined minimum standard.

These three methods are explained in some additional detail below.

Frequency Distributions

By grouping together like test results, we can determine, either graphically or mathematically, something of the process or larger group of items from which these results were obtained. For example, in the distributions shown in Table I, each "x" represents an individual test. It is apparent that while all meet the specifications, Lot A is averaging too low for safety, Lot B is both too high and so spread out that some additional tests would probably be outside requirements, C seems a mixture of two different sets of producing conditions, D indicates a more satisfactory situation, and E has a uniformity which perhaps might be moved toward the most economical specification limit and still give compliance with requirements.

TABLE I—FREQUENCY DISTRIBUTION

Specifications	Lot A	Lot B	Lot C	Lot D	Lot E
Maximum	—	xx	xx	—	—
	—	xxx	xxxxx	xx	x
	xx	xxxx	xx	xxxxxx	xx
	xxx	xxx	x	xxxxx	xxxxxxxxx
	xxxxxx	x	xxxx	xx	xx
	xxxx	xx	xxx	x	—
Minimum	xx	—	x	—	—

Note: each "x" represents an individual test.

Control Charts

Statistical, or Shewhart, control charts are more than simple graphs of test or inspection data. They include "process control limits" which are not derived from design requirements or specifications, but from the process data itself. These control limits representing the short-term variation, when operation and materials are relatively uniform, therefore indicate the process capability. Variations outside these limits have an "assignable cause" which may be located and in many instances corrected. Frequently these control limits are wider than the permitted specifications. This only means that the present process is not capable, even with good operation, of meeting specifications.

Control charts may be used to determine logical specifications or to analyze experimental or special data. However, their main purpose is to control production by indicating when to adjust, investigate, or reject—and when to leave alone. They are one of the most powerful and useful tools of modern quality control. Charts can be used to advantage with either variable or attribute data for machine, process, or hand operations, either in conditions of good control or complete lack of control.

Sampling Plans

Statistical sampling is used for the accurate segregation of good and bad lots of material or product, and to determine the per cent defectives (or average test result) within required accuracy limits. This is far different from older ideas of "percentage sampling" —which is usually unworkable and illogical. Statistical sampling has been found useful in many cases for the replacement of 100 per cent sorting. Although sometimes very advantageous, elimination of sorting operations by sampling is a minor part of SQC techniques and is usually the result of improved material and process control. There are many instances where 100 per cent inspection or testing must be continued. As a matter of fact, all of the SQC methods are especially important where 100 per cent sorting is required, since this indicates either very stringent product requirements or the production of appreciable defects.

All of these methods of SQC have in common the advantages of requiring the executive or technician to

consider his actual requirements in terms of the process average, spread and apparent capabilities; to give thought to the accuracy of his sampling or testing; and to consider, in advance, the actions he plans—dependent upon results. Logical consideration of these items is an important part of statistical control and is normally lacking without some concept of SQC.

Statistics for Experimentation and Trouble Shooting

There are three general types of experimentation. Each has its useful place and each should be understood well by the executive in charge of research, development, or process trouble-shooting. (There is also the "Medicine Cabinet Experiment," described as "take two of everything and hope something works!") Recommended types of experimentation are:

The Laboratory Method. Change one variable and hold all others constant.

The Production Method. Change one variable and let all others randomize or balance out.

The Statistical Method. Change several of the variables considered most important, in accordance with a planned program, hold others constant at normal levels, and randomize the remainder.

The laboratory chemist or process engineer often refers to the need for "making one change at a time" so that the effect of this can be determined. This "laboratory method" of experimentation has value in many situations but, unfortunately, such laboratory-type experiments often do not give comparable results in production. This is usually because some condition was not really "controlled" in the lab test, was controlled at an abnormal level, or because some unconsidered change in another variable has negated the preliminary results.

The production man, on the other hand, often favors a long term "production run" so that the effect of a change can be tested over random process conditions. Certainly, in the long run, actual operation will determine the effect of a change (although comparison with some better or cheaper change may be lacking). However, there is usually not sufficient time to depend upon production-type experiments for evaluations, and too often these are run with insufficient time so that the related effect of other variables is not randomized or balanced out. Every production man knows of changes that seemed good at first but later turned out to be undesirable. Perhaps more important, few know the number of proposals which were turned down on the basis of preliminary unfavorable indications which might have actually proven useful.

The statistical type of experiment is based on the belief that there may be several important variables, the independent and interrelated effects of which should be investigated. This type of experiment is not required if the cause of defects or other cause-effect relationship is *known*. In such cases, the simplest laboratory or production type experiment will serve to prove this knowledge to the satisfaction of others. If however there may be a number of variables, often at several levels, which must be checked, then the statistical experiment will do this with greater economy of time and tests than an independent series of either laboratory or production investigations. In addition, the statistical experiment will evaluate the possible inter-related effect of different variables, which is seldom done by the laboratory experiment and never done by the production method.

The statistical experiment makes use of all the process knowledge and experience of those planning it. It also has the advantage of a carefully planned program using modern statistical techniques for the most economical planning and the most accurate evaluation. For complex problems, it offers the best chance of prompt and reliable solution.

Evaluation of Effective Use of SQC

In view of the many companies which already have done some training and utilization of SQC methods, it may be of interest to review the methods by which the success of applications may be evaluated. There are several common categories into which companies making ineffective use of statistical control fall. A little checking or introspection will usually determine if your use of SQC has one of these failings:

Too Limited Knowledge. Many companies have trained only men with high school education, who are simply not equipped, either by prior training or by interest, to learn new mathematical techniques. The man trained to use SQC in your plant should be equivalent in basic training and intellect to a man you would train to head up cost accounting, time and motion study, or sales forecasting.

Too Much Theory. On the other hand, some companies have hired statistical or math majors, often with little or no practical QC experience, and found these men too interested in the complexities of variance analysis, random balance, multiple correlation, etc., and too little interested in reducing scrap and complaints. With proper guidance (which requires at least an ability to communicate in a common language) such a statistician may be extremely useful. Without this direction, he will soon gravitate elsewhere and the company will decide SQC does not work.

Too Many Graphs, Too Little Action. If your SQC man has a desk or wall full of neat graphs or charts which no one really uses to advantage, then you are suffering from a lack of good direction of this effort. The graphs may be of great potential value, or they may be pure boondoggling, but in any event the money you are spending on SQC is being wasted.

SQC Talent Available, But Seldom Used. Some few companies have well trained and practical men available to work on statistical control and investigation problems but their efforts are either little used, or are restricted to areas of minor importance. Such a condition indicates a need for indoctrination training so that other groups will request statistical assistance, and also review of organization and assignments of functions. In this regard, the reader is referred to Part II in this series.

On the positive side, if you are making effective use of SQC, you will not need a questionnaire and are probably reading this only for casual interest. You and your company already are well aware of SQC

benefits and are regularly increasing the use of statistical techniques to aid in the solution of company technical problems.

Summary

There are many important scientific methods in modern quality control. In some operations, statistical quality control is the most important of these. In many others, it is less important than some other group of control techniques. However, SQC is of some important use in every mass production industry and plant known to the writers, and also of value in many "job-shop" type operations. The company which feels that SQC has no place in its quality control problems probably has no known quality control problems or else has no comprehensive knowledge of modern SQC.

The techniques and methods of application of SQC vary widely, but regardless of the type of technique used, all SQC methods have as their basis the application of mathematical laws to test and production data, so that more useful information may be obtained. Since SQC methods can be applied to almost any type of data (sales, accidents, absenteeism, clerical errors, traffic delays, as well as inspection or test data) they can be used regardless of product or process. The fact that there are a large number of variables does not preclude use of SQC; it makes its use more necessary. The fact that variations are due to personnel rather than machines likewise has no effect on the use of SQC, since the statistical techniques will separate normal and abnormal variation just as well on a hand operation as they will on a precise machine.

SQC application does take skill and experience in the process and product, as well as in the statistical techniques. The more complex the operations and the problems, the greater the skill and training required in both statistical and process engineering. In addition, SQC will never *solve* any problems. It will only help the competent man solve problems. Plant experience, engineering knowledge, effective and good communications and organizations are all required. With these SQC has proven valuable. Without them little can be accomplished.

Literature References

No area of modern quality control is as well documented as statistical quality control methods. The following books are only a few that the writers suggest. Of course, comments are only personal observations. Many competent QC men would differ in their recommendations.

There are many fine articles on Statistical Quality Control in *Industrial Quality Control,* published by the American Society for Quality Control, Room 6197 Plankinton Building, 161 West Wisconsin Avenue, Milwaukee 3, Wisconsin.

Other technical publications have featured articles on SQC. One, which may be conveniently available to many rubber companies, is the series of articles on SQC by M. E. Wescott which appeared in *Rubber World* during the summer of 1959.

No attempt has been made to list the many fine books and articles bearing on quality control and its application to specific problems or areas.

(1) Shewart, W. A., *Economic Control of Quality of Manufactured Product.* D. Van Nostrand Co., Princeton, N.J., 1931. By no means light reading, but a "must" for the career quality director and stimulating for the scientific-minded executive.

(2) Juran, J. M., *Management of Inspection and Quality Control,* Harper and Bros., New York, 1945. Largely aimed at the machine and assembly industries and unfortunately now out of print. However available in most libraries and still up-to-date in many of its ideas.

(3) Juran, J. M., *Quality Control Handbook,* McGraw-Hill, New York, 1951. Too detailed for general reading, but useful as a reference. The executive will find sections of interest on organization, quality concepts, specifications etc.

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(12) Moroney, M. J., *Facts from Figures,* Pelican Books, Baltimore, Maryland, 1951. This pocket book is low in cost and high in readability. Good for those with a general interest in what statistics is and does.

(13) Brownlee, K. A., *Industrial Experimentation,* 4th American edition, Chemical Publishing Co., New York, 1952. Mainly a "cook book" of experimental designs and unfortunately poor typography, but believed the best elementary book for the engineer concerned with statistically designed experiments.

(14) Davis, O. L., editor, *Design and Analysis of Industrial Experiments,* 2nd edition, Hafner Publishing Co., New York, 1956. The contributions of many persons active in the field have been combined in this well edited book for the advanced QC engineer.

(15) Brownlee, K. A., *Statistical Theory and Methodology in Science and Engineering,* John Wiley & Sons, New York, 1960. This volume will be of interest to the more advanced QC engineer, but it is not intended for the man beginning this work.

A trend toward the use of the load center principle is becoming evident in rubber industry distribution systems. Here are six of the basic system-circuit arrangements.

Switchgear in Rubber Plants

A survey of modern distribution system design practices

By

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A GROWING trend toward use of the load-center principle is evident in industrial distribution systems. An example of this trend occurred when the Firestone Tire & Rubber Co. specified two 1000-kva substations and one 300-kva unit for handling all low-voltage power in its new tire plant in Bethune, France.

While the application of switchgear to rubber plant distribution systems involves many factors which cannot be adequately covered in a single article, a general survey of modern practices in such systems should be helpful to the plant engineer.

Various Systems in Use

Most common arrangement is the simple radial system (Figure 1) which has only one primary feeder and one transformer through which a given secondary bus is supplied. With adequate equipment properly installed, this system is safe, economical, easy to operate, and flexible.

While the primary cable and non-inflammable liquid-filled transformer in the simple radial system have a high degree of reliability—approximately one failure per mile per 100 years for the former and one failure for every 2500 transformer years—its chief disadvantage is the complete de-energization of the load area for maintenance.

To avoid de-energizing the load area during scheduled shutdowns and to obtain greater flexibility, the simple radial system can be modified with a normal open tie breaker between pairs of double-ended substations to form a "secondary selective arrangement" (Figure 2).

During normal operation, each substation services its own load area independently as in a straight radial system. In case of an outage of one primary feeder or transformer, the transformer secondary breaker of the de-energized substation is opened and the tie breaker is closed allowing the energized transformer to feed both load areas.

Since the secondary selective system operates normally as a simple radial, it is as safe, easy to operate and uncomplicated as the radial. However, it may be from 5 to 75 per cent costlier, depending upon the reserve transformer capacity required.

The straight radial and secondary selective systems are used in about 90 per cent of industrial load-center distribution systems. The 400-volt system at the new Firestone Bethune plant is a secondary selective arrangement involving three substations instead of two.

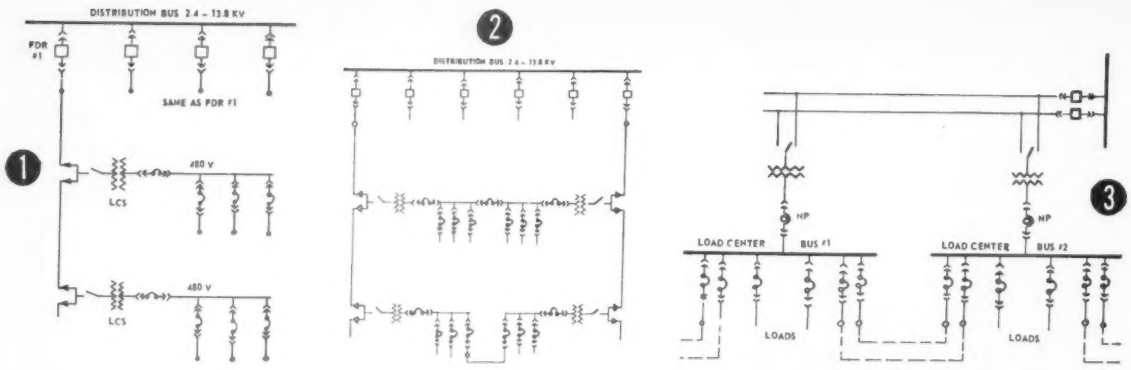

FIG. 1—Radial distribution system (modern); FIG. 2—Secondary selective system; FIG. 3—Secondary network scheme.

The third basic load-center system circuit arrangement is the secondary network (Figure 3) which is used in only 1 to 2 per cent of industrial systems due to its higher cost. However, it does have certain advantages which could justify the larger investment.

This system differs from all others in that all substation transformers are operated in parallel and, in the event of a primary feeder or transformer fault, automatically switches off the faulty circuit. This system has the main advantage of allowing large load shifts between substations without appreciably increasing the load on any one transformer.

Fourth Arrangement

The primary selective system, fourth basic arrangement (Figure 4), differs from the other three in that two primary feeders are brought to each substation. This system provides service to the load-center substations in event of a primary cable failure. Its use may be desirable where load centers are widely dispersed and primary cables are located in areas where they are subject to damage. Some of the rubber companies use this system frequently, others seldom.

Basic component of the load-center system with secondary voltages 600 volts and below is the load center unit substation. A load center substation consists of incoming line, transformer and secondary distribution feeder sections.

The incoming line section may be metal-clad drawout switchgear, a fused or unfused magnetizing current (Mag-I) or load break switch, an oil cutout or a junction box. Rubber firms in the Akron area are now using the Mag-I switch exclusively. The transformer may be oil-filled, non-inflammable liquid-filled, or sealed dry type. Ventilated dry type transformers are never used in rubber manufacturing plants due to the presence of highly conductive carbon black in the air. The secondary distribution section is normally metal-enclosed drawout switchgear with large circuit breakers.

Load-center switchgear in rubber plants is always coordinated with the primary feeder system and the secondary feeder circuits to insure application of

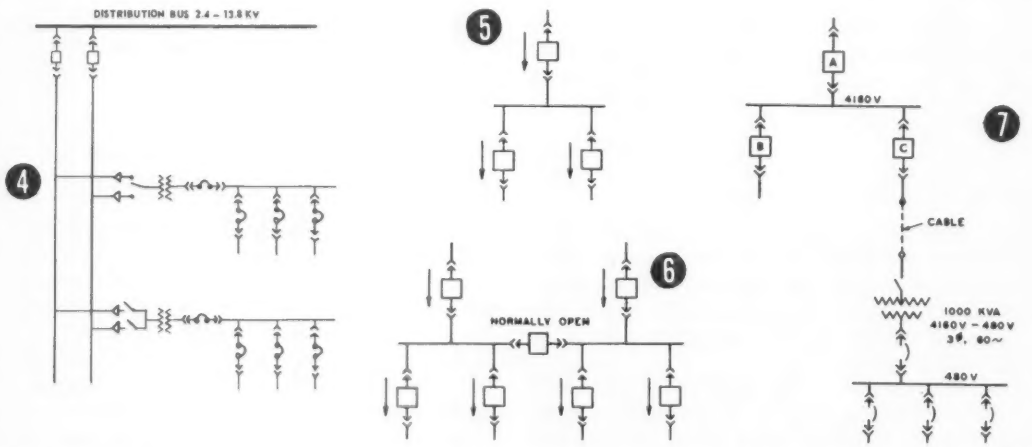

FIG. 4—Primary selective system; FIG. 5—Basic industrial bus arrangement; FIG. 6—Two-source sectionalized bus; FIG. 7—Radial distribution system from source to load side of feeder in load-center substation.

TABLE I—RATINGS FOR METAL-CLAD EQUIPMENT WITH OILLESS POWER CIRCUIT BREAKERS

Item	Interrupting Rating in Mva	Rating in KV	Minimum Operating KV at Rated Mva	Continuous Current Rating in Amperes At 60 Cycles	Withstand Test KV At 60 Cycles (RMS)	Withstand Test KV Impulse (Crest Value)	Momentary Rating in RMS Total Amperes	Interrupting Ratings in RMS Total Amperes For 60-cycle Systems At Rated Voltage	Interrupting Ratings in RMS Total Amperes For 60-cycle Systems Maximum
1	75	4.16	3.5	1200	19	60	20000	10400	12500
2	150	4.16	3.5	600	19	60	40000	21000	25000
3	150	4.16	3.5	1200	19	60	40000	21000	25000
4	150	4.16	3.5	2000	19	60	40000	21000	25000
5	250	4.16	3.85	1200	19	60	60000	35000	37500
6	250	4.16	3.85	2000	19	60	60000	35000	37500
7	350	4.16	4	1200	19	60	80000	48600	50000
8	350	4.16	4	3000	19	60	80000	48600	50000
9	250	7.2	4.6	1200	36	95	51000	20000	32000
10	250	7.2	4.6	2000	36	95	51000	20000	32000
11	500	7.2	6.6	1200	36	95	70000	40000	44000
12	500	7.2	6.6	2000	36	95	70000	40000	44000
13	150	13.8	6.6	600	36	95	20000	6300	13000
14	150	13.8	6.6	1200	36	95	20000	6300	13000
15	250	13.8	6.6	1200	36	95	35000	10600	22000
16	250	13.8	6.6	2000	36	95	35000	10600	22000
17	500	13.8	11.5	1200	36	95	40000	21000	25000
18	500	13.8	11.5	2000	36	95	40000	21000	25000
19	500	13.8	11.5	1200	36	95	60000	21000	25000
20	500	13.8	11.5	2000	36	95	60000	21000	25000
21	750	13.8	11.5	1200	36	95	60000	31500	37500
22	750	13.8	11.5	2000	36	95	60000	31500	37500
23	750	13.8	11.5	1200	36	95	80000	31500	37500
24	750	13.8	11.5	2000	36	95	80000	31500	37500
25	1000	13.8	11.5	1200 3000	36	95	80000	42000	50000

breakers with adequate interrupting and continuous current ratings. After the correct breakers are chosen, the number of feeder breakers are selected on the basis of load requirements.

Transformer secondary or main breakers are practically always used for feeder back-up protection, for quick de-energization of all feeders in case of emergency, and for future expansion to transform a radial to a secondary selective system.

Regardless of the load-center circuit arrangement, metal-clad drawout switchgear provides the vital link between the power source and the load-centers. In every primary circuit arrangement, it provides short-circuit and overload protection to the primary feeder cables and the load-center transformers.

Bus Arrangement

The basic industrial bus arrangement consists of one source breaker and two or more feeder breakers (Figure 5). Any other arrangement is used mainly to improve service reliability to all or part of the load during scheduled outages or in the event of source or equipment failure.

A common variation of the basic primary bus arrangement is the two-source sectionalized-bus (Figure 6). Here the bus tie is operated normally open and each source breaker supplies one-half of the bus. If one source fails or is shut down for maintenance, the source breaker is opened and the tie breaker closed allowing the other source to supply all of the bus. This arrangement is similar to the secondary selective system and is simple, safe and easy to operate.

An example of how to determine the magnitude of short-circuits is to be found in the single line diagram of a radial distribution system from the source to the load side of a feeder in the load-center unit substation (Figure 7).

In this instance, the power company calculated the available short-circuit at the point of entrance to the industrial plant at 100,000 kva. This figure was arrived at by calculating the fault currents available from all of the power company's rotating machines, generators and synchronous condensers, and reducing this current in proportion to the amount of impedance between the generators and the industrial plant.

With the interrupting capacity of breakers A, B, and C determined, the proper breaker rating—4160 volts with a 150,000-kva interrupting capacity — is selected from Table I. This breaker will give some reserve capacity in the event the utility's available

TABLE II—DETERMINING AVAILABLE SHORT-CIRCUIT ON 480-VOLT BUS

Transformer Rating 3ø KVA & % IZ	Max. Short Circuit KVA Available Primary System	Normal Load Continuous Amp.	Transformer Alone	100% Motor Load	Combined	Recommended Large Air Circuit Breaker Interrupting Capacity in Thousands of Amperes* M	F	C	S
	50,000		8900		10700				
	100,000		9400		11200				
300	150,000	361	9600	1800	11400	25	15	15	15
4.5%	250,000		9800		11600				
	500,000		9900		11700				
	Unlimited		10000		11800				
	50,000		13700		16700				
	100,000		15100		18100				
500	150,000	601	15600	3000	18600	50	15	15	25
4.5%	250,000		16000		19000				
	500,000		16400		19400				
	Unlimited		16800		19800				
	50,000		15500		20000				
	100,000		17300		21800				
750	150,000	902	18100	4500	22600	50	15	15	25
5.75%	250,000		18700		23200				
	500,000		19200		23700				
	Unlimited		19600		24100				
	50,000		19500		25500				
	100,000		22400		28400				
1000	150,000	1203	23500	6000	29500	50	25	15	50
5.75%	250,000		24500		30500				
	500,000		25300		31300				
	Unlimited		26200		32200				
	50,000		25800		34800		25		
	100,000		31200		40200		50		
1500	150,000	1804	33500	9000	42500	75	50	15	50
5.75%	250,000		35600		44600		50		
	500,000		37300		46300		50		
	Unlimited		39400		48400		50		
	50,000		30900		42900		50	15	50
	100,000		38200		50200		50	25	75
2000	150,000	2406	42600	12000	54600	75	50	25	75
5.75%	250,000		45900		57900		50	25	75
	500,000		48700		60700		75	25	75
	Unlimited		52400		64400		75	25	75

Note: M = Main Breaker; F = Fully Rated System; C = Cascade System; S = Selective System.

short-circuit should increase with the addition of a new generator or if large synchronous motors are added to the plant's distribution system.

Available Short-Circuit

To determine available short-circuit on the 480-volt bus, neglect the impedance of the primary cable. By omitting the cable impedance, the available short circuit at the primary of the 1000-kva transformer is 100,000 kva.

According to Table II, the short-circuit on the 480-volt bus is 22,400 amperes if no motors are connected to the bus. Motors contribute short-circuit current for a brief period. If it is assumed that there is a 1000-kva motor load connected to the 480-volt bus, the actual short-circuit current available is 28,400 amperes. Therefore, the secondary breakers should have a minimum short circuit capacity of 28,400 amperes at 480 volts.

It is never wise to select the rating of a circuit breaker without knowing all the facts concerning future expansion of the plant and future plans of the utility. Some plant distribution systems grow to a point where the circuit protective devices become inadequate and unsafe.

EDITORIAL

Impertinent Questions on Pertinent Subjects

► If synthetic rubber had not been developed, what would No. 1 Ribbed Smoked Sheet be selling for now?

► If the United States Government still controlled synthetic rubber producing facilities, what would be the price per pound of general purpose synthetic?

► If agricultural science developed a method whereby a rubber tree would be fruitful at the end of two years rather than seven, would capital investment in rubber growing areas increase?

► If a greater demand existed for butyl rubber tires, how long would you have to wait before you could buy a replacement tire?

► If the natural rubber stockpile were released, would Malaya go Communist?

► If a domestic footwear manufacturer goes to Hong Kong on a vacation, does he buy a $30 hand-tailored suit?

► If carbon black were white, how many tons would be sold in a given year?

► If authoritative groups finally and unequivocally decided to call urethane a plastic, what business would *you* be in?

► If the government removed itself from all areas of business and commerce, would your company be better off?

► If hospitality suites were non-existent at Rubber Division meetings, would you go?

Answered the questions? Come to any conclusions? Have any questions of your own you would like to submit? We've played the game and we have some of our own answers—if few conclusions. What can safely be said is:

(1) Rubber manufacturers are human.

(2) Rubber manufacturers must not only know what is going on in their own plants, they must also know what is going on in Indonesia.

(3) A rose smells as sweet by any other name.

(4) Editors get as tired as anybody else.

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BUSINESS CREDIT

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► Business credit can be defined in many ways but one rubber industry secretary-treasurer has summarized it in this fashion: "Credit is a privilege extended by the seller to the buyer, entitling the buyer to the use of money, commodities, or services for a specified period of time. It is based on confidence in the buyer's ability and willingness to pay the agreed amount when it is due." Placing trust is at the heart of credit, but it also involves risk, economic exchange and futurity.

Business credit usually refers to credit transactions at the manufacturing and wholesale levels, in this respect unlike bank credit and consumer credit, which are two of the more common other types. One indication of the importance of credit in today's business world is the membership of the National Association of Credit Management, which now numbers about 35,500 managers of business credit. Of these about 44 per cent manage credit for wholesalers, jobbers, and distributors, and another 35 per cent do this job for manufacturers. About five per cent are credit managers in banks, and the remainder manage credits for service organizations, factors, public utilities, and other non-retail concerns.

The Credit Manager's Job

The modern credit manager's job, putting it plainly, is to get the most business with the least loss. It is axiomatic that no sale is complete until the money has been collected. The success of a company depends to a large extent upon the degree to which sales and credit functions can be coordinated.

Interviewed for this article, the credit manager of a West Coast rubber company says that building a sound business is like building a house. Sales are the foundation, manufacturing the walls, and collection the roof. Says he: "With one of these missing, there can be no house."

It is the credit department's job to protect the profits from sales and deliver them to the company's treasury. Any failure in the performance of this function is more costly to the company than the failure to make the sale itself. In a company operating on a net profit of 5 per cent of sales, it will take $2,000 in new sales to recoup a single charge-off of $100.

Appraising the customer as a credit risk thus becomes one of the key responsibilities of the credit executive. To do this the credit manager looks hard at the customer's character, capital, and capacity—criteria ranked in that order by credit executives themselves in a recent survey.

In fact, 53 per cent of the executives surveyed put character first. The credit manager needs to answer this question: "Does the customer have integrity and want to pay his bills?" Capital was ranked first by more than a fourth of the managers. "Does the man have the money to pay his bills?" And capacity, ranked as the single most crucial factor by 12 per cent, answers the question: "Is the business itself strong and productive enough to produce sufficient revenue to pay bills?"

In appraising a customer, a credit executive also looks at business conditions and economic trends, both overall and in the specific industry, such as the rubber industry. About nine per cent of the men surveyed named this factor as most crucial, along with such others as location of the business, insurance coverage, collateral, and cash on hand.

A Midwest wholesale rubber distributor says, "When you get right down to bedrock, there are only two types of people who owe you a past due account. One is the fellow who would like to pay you but can't; the other is the fellow who could pay you, but won't. Fortunately, we have found that more than 99½ per cent of our collection problems are with the latter type."

The tough customers to appraise, obviously, are the marginal customers. Significantly, in a recent NACM survey of members not a single credit manager said his company had no marginal customers. The annual sales volume of the respondents' companies ranged from under $100,000 to more than $1 billion. This survey revealed that exactly one out of four companies depends on marginal customers for 21 per cent or more of its total sales volume, and another third of the companies gets from 11 to 20 per cent of its business from marginal accounts.

The marginal account has at least four fundamental characteristics: (1) responsible management, (2) strong sales potential, (3) a record of slow payments, and (4) inadequate working capital. There are other plus and minus factors, of course. Products with a high profit margin, for example, might be sold profitably even though collection is expected to be slow. The customer's capacity to produce, his experience in a line, and a good location might outweigh handicaps such as lack of money and indebtedness. It is with this mixture of handicaps and desireable qualities that a credit manager must work in helping the customer help himself, and over the long range, the creditor's own company. One rubber industry credit executive describes the credit department's normal credit checking procedures like this:

How Credit Checking Works

"As orders come in they are submitted to the credit department for approval. If it is someone to whom we have been selling regularly and the account has been taken care of satisfactorily, credit approval is automatic. If the order is from someone we have never sold before, or have not had an opportunity to investigate from a salesman's request, we then start an immediate investigation through regular channels. We find that the most helpful of these is the local Credit Interchange Bureau of the National Association of Credit Management which usually has or can get for us information from other creditors on 'how he pays.'"

The general credit manager of a large tire company describes his ap-

proach to wholesalers as follows: "For the most part we sell to the small businessman in a highly competitive industry. An efficient hard-hitting organization is required to produce profits in the tire business. For us, it is necessary to sell a large proportion of marginal credit accounts.

"A high percentage of our dealers have inadequate capital for their needs. This is caused primarily by a multiplicity of product lines and special inducements to buy in quantities which, in turn, results in a slow inventory turnover. Added to this is the necessity of making retail sales on extended terms, creating the need for a large investment in receivables. In some industries, such as automobiles and appliances, dealers' receivables are sold to finance companies. Tire accounts are not generally acceptable to finance companies.

"It is well known that the heads of very few small businesses have much knowledge or training in financial management. This is fine, if necessary financial management can be hired, but seldom can this be fitted into the budget. As we are normally by far the largest creditor, it is our job to find a way to keep our customers financially healthy.

Making the Credit Decision

"The first thing a credit manager must have to make intelligent decisions is a current balance sheet and operating statement on major accounts and marginal outlets. It is then possible to put the finger on the strengths and weaknesses of a business and not only make sound credit decisions, but properly advise the customer. By refusing to permit a customer's account to get out of hand, we know that we are performing a real service.

"In our business, credit executives must spend much of their time in the field consulting with our customers and trying to solve their financial problems. Under certain conditions, it is possible for us to extend long-term financing to support inventories, receivables, or equipment. The application of these programs becomes the responsibility of our credit department, and they have served an important role in building successful tire outlets in the industry.

"We try to teach our sales outlets to apply for bank loans where necessary and guide them in seeking applications for long-term help from the Small Business Administration, insurance companies, or other financial institutions. The key, of course, is an intelligent analysis of needs and proper financial planning for repayment. We try to teach these fundamentals to those of our customers who need this advice.

"Establishing a credit line on a new account of any size with our company will normally require a personal call by the credit manager. He will first assemble all the usual credit information possible from the outside and then obtain the latest balance sheet and operating statement at the time of the visit. These are then analyzed on the spot and discussed with the customer.

Informing the Customer

"This procedure establishes the proper relationship between our credit department and the dealer, helps us gain his confidence, and obtain a sound appraisal of the management of the business, its problems, and its potential. We also tell the customer the credit line that will be assigned to his account and explain our terms and the way we do business.

"Approval of incoming orders is, in many cases, routine, but we are faced constantly with decisions on larger orders which will stretch the credit limit of the customer. This is particularly true during the winter months when the rubber industry extends spring dating terms. It takes a great deal of sales ability and frequently some backbone to refuse or reduce an order for an important account. We prefer to do this by phone or a personal contact wherever possible. Our principal objective is to make sure our customer knows that this is for his own protection as well as ours."

The credit manager of the footwear division of a major rubber manufacturer has this to say about the "hundreds of cases each year of borderline or marginal accounts that could be and must be sold":

"Gone is the picture of the scowling growling credit man pounding his desk and saying 'No!' Today we must change this to 'How?' We are all in competition, looking for sales, new outlets. It is easy to say no on the face of things as they appear. It is much more difficult to say, 'How can I sell this man and protect our investment?' "

The Overdue Account

This is the everyday job of the credit manager, yet even the best credit manager's judgment is not always foolproof. Decisions to extend credit often have to be made on incomplete or obsolescent information. And an individual, as well as the economic climate, can run into a spell of bad weather. The credit manager then faces one of his most trying problems: collecting the long overdue accounts.

Every credit sale involves the time factor—a later date when the money becomes due. When a customer fails to pay on time, he is, in effect, operating on an interest-free loan from the seller. In some segments of the rubber industry, the problem is complicated by seasonal datings, permitting discounts, on some lines, as long as four and six months after the sale. A discount, often of about 2 per cent, is granted customers for paying on time. This is designed to induce prompter payment.

All sound collection methods must begin with a good system, a firm policy, and a regular procedure for analyzing overdue accounts — who owes how much, and how long the amount is overdue.

The credit manager's first step in control is to make an "aging study" of accounts receivable. In many industries, the pattern is to divide accounts into groups overdue 30, 60, and 90 days. With seasonal datings typical of some rubber goods industries, of course, the time breakdown could stretch out to much longer periods. Many credit executives claim that accounts 30 days slow are worth only about 90 cents on the dollar, with a progressive drop proportionate to the degree of lateness. If an account is unpaid for a year, say credit managers, it is questionable if it's worth even 25 cents on the dollar.

Prompt and well-planned action is, therefore, called for. The credit department will take the first steps to collect. If this fails, the account may be put in the hands of a reputable, approved collection bureau. Ultimately, the case may be put in the hands of a lawyer.

Paramount in importance through all these procedures is an approach that combines tact with forcefulness. The object is to get the money and, at the same time, keep the customer's goodwill. This objective puts a premium on the credit manager's understanding of psychology, patient determination, and letter-writing skill.

Standards of Success

In most companies, the effectiveness of the credit department is appraised by one or more of three widely used gauges: (1) percentage of credit sales collected in any given period, (2) ratio of bad debt losses to sales, and (3) some measure of how long past-due accounts have been owing. These yardsticks yield a measure of how much cash the credit department keeps flowing in, how fast it collects it, and how little it loses.

Managing credit, then, is running the instrument that permits the flow of goods and services through the market. The credit manager's job is to keep that instrument in sound working order.

NEWS REPORTS

and industry activities

APRIL, 1961

FTC Rules Against Tire Sales Commissions

► The Federal Trade Commission, in an action taken on March 15, 1961, ruled that separate contracts entered into by the Firestone Tire & Rubber Co. and the Goodyear Tire & Rubber Co. with the Atlantic Refining Co. and the Shell Oil Co. "have unlawfully injured competition" in the distribution of tires, batteries, and accessories at the manufacturing, wholesale, and retail levels."

The FTC ordered immediate cancellation of the contracts between the tire and oil companies, together with similar contracts held by any one of them "with any other companies."

The Government agency sent a companion case involving the B. F. Goodrich Co. and the Texas Co. back to an FTC examiner to develop further evidence.

Earl B. Hathaway, vice-president of sales for Firestone, stated that the company will file an appeal of the FTC cease and desist order. He pointed out that the sales commission plan has been a common practice in the rubber industry for 30 years and has always been accepted as legal. He based his opinion on the fact that the FTC ruling reversed a previous ruling of the trial examiner, rendered on October 23, 1959, who held that the sales commission plan was legal and absolved Firestone of all charges of coercion in connection with the administration of the plan.

Goodyear reports that it also will aggressively appeal the FTC ruling. According to O. E. Miles, a vice-president of the company, this is the first time that the sales commission plan, which is historic in the industry, has been held to be illegal, and represents new law on the subject.

According to the FTC, Shell and Atlantic were paid commissions of from 7.5 to 10 per cent by Firestone and Goodyear for assistance in getting orders from their service stations. The payments were made on a monthly basis. For example, in 1955 Atlantic received more than $500,000 each from Firestone and Goodyear in commissions, the FTC stated. In addition, by 1957 the two tire manufacturers were paying Shell a total of more than $3,500,000 annually on dealer purchases.

The Government's opinion was written by outgoing FTC Chairman Earl W. Kintner. He said the FTC found evidence that the oil companies "coerced" their dealers into buying the sponsored products under threat of lease cancellation or other retaliation.

Mr. Kintner reported that wholesaler dealers handling products of such companies as U. S. Rubber Co., Lee Rubber & Tire Corp., and Mansfield Tire & Rubber Co. testified that they were unable to sell tires to Atlantic service station dealers, except upon an occasional "pickup" basis when a motorist demanded a tire brand other than the locally sponsored offering available at the station.

FTC Warns Tire Industry

► In its second warning to tire manufacturers and dealers, the Federal Trade Commission has called for an end to deceptive pricing practices. The commission revealed that a letter has been sent to the industry asking for data on use of comparative retail price claims and asking how guarantees to purchasers were carried out. Increasing complaints against improper advertising and guarantees have resulted in a warning that failure to comply with laws could lead to investigation and court action.

An index to Volume 88 of RUBBER AGE will be found on pages 177 to 180 of this issue.

Firestone Files Suit Against General Tire

► Firestone Tire & Rubber Co. is suing the General Tire & Rubber Co. over General Tire's recently-issued patent for the use of oil-extended rubber. The suit, filed by Firestone in Federal Court at Baltimore, Md., asks that the patent be declared void and invalid and the court recognize that Firestone and its customers now possess the right to use oil-extended rubber freely and without restriction throughout the world.

McCreary Tire & Rubber Co., Indiana, Penna., joined Firestone as a plaintiff to determine its rights as an independent tire company which uses oil-extended rubber manufactured and sold by Firestone. Both Firestone and McCreary Tire believe that a favorable ruling would set a precedent for the protection of all small tire companies using oil-extended rubber.

According to Firestone, it filed suit after General Tire repeatedly threatened legal action against the firm and its customers. The suit also asks the court to restrain General Tire from threatening legal action, charging infringement and otherwise harassing Firestone and its customers.

Firestone pointed out that the recent actions by General Tire are in violation of that company's obligations under a research contract it held with the Federal Government from 1949 to 1955. Firestone claims that all work done by General Tire on oil-extended rubber came under this contract, and contends that it has already purchased rights under the contract from the Government.

A Firestone spokesman declared that the principles involved are important because the public has already paid for the development of oil-extended rubber through Government contracts, and a royalty to General Tire in effect would mean a second payment by the public.

Firestone Buys Dayco's Dayton Tire Division

► An agreement was reached on March 27 between the Firestone Tire & Rubber Co. and the Dayco Corp. for the purchase of the Tire Division of Dayco by Firestone. The purchase was for cash, but the price was not disclosed. Firestone will acquire the assets of the Dayton Tire Division including manufacturing facilities, equipment and furnishings, inventory, and the Dayton brand name. None of the technical service agreements of Dayco or its predecessor, the Dayton Rubber Co., with foreign tire companies is included in the proposed sale.

Raymond C. Firestone, president of Firestone, stated that the acquisition of the Dayton facilities was part of the company's program of increasing productive capacity to satisfy its increased business. "We expect to maintain and increase production of Dayton tires, in the plant," he said, "and offer full cooperation to all Dayton dealers, distributors, and other customers."

The acquisition will be operated as a subsidiary of Firestone under the name of the Dayton Tire & Rubber Co. C. M. Barnes, formerly assistant to president of the Firestone Tire & Rubber Co. of Calif., has been elected president of the new subsidiary.

According to A. L. Freedlander, Dayco chairman, the sale of the tire business to Firestone will enable Dayco to concentrate its activities on other segments of the rubber industry and at the same time assure Dayton tire distributors of a steady supply of Dayton brand tires. He added that "Firestone's purchase of the Dayco tire plant assures continued operation of the Dayton Tire Division."

Mr. Freedlander emphasized that "the sale is solely of the tire division and in no way affects our other ten manufacturing plants, our other subsidiaries and divisions, and our foreign technical agreements."

According to the Dayco chairman, the proceeds of the sale will be applied against existing indebtedness so that its annual interest charge will be reduced by approximately $1 million per year. Mr. Freedlander further stated that this sale in no way affects Dayco's substantial holdings in the Copolymer Rubber & Chemical Corp. of Baton Rouge, La.

The Dayton Tire Division represented about 30 per cent of Dayco's total sales volume. The remaining divisions and subsidiaries, which account for 70 per cent of Dayco's sales, have been over the years more profitable than the tire division, Mr. Freedlander pointed out.

Carlo Giraudi

Witco Vice-President

► Dr. Carlo Giraudi has been elected vice-president for research, development, and engineering of the Witco Chemical Co., Inc., New York, N. Y. Previously, Dr. Giraudi was vice-president and technical director of the Ultra Chemical Works, Inc., a Witco subsidiary, which he joined in 1949. In his new post, his responsibilities extend to all Witco divisions and subsidiaries, including the Sonneborn Chemical & Refining Corp., the Ultra Chemical Works, Inc., and other wholly-owned company operations, both foreign and domestic. Dr. Giraudi received his Ph.D. from the Polytechnic Institute of Milan, Italy, and is a member of the American Chemical Society, the American Institute of Chemical Engineers, and the American Management Association.

Scrap Rubber Officers

► The Scrap Rubber and Plastics Institute elected its officers for 1961-1962 during the 48th Annual Convention of the National Association of Secondary Material Industries, held on March 13 at the Fairmont Hotel in San Francisco, Calif. The new officers are: *President*, Sidney Freedman (H. Muehlstein); *Vice-President*, Ben Gordon (A. Schulman); *Secretary-Treasurer*, Elinor B. Roberts (NASMI Staff).

Erect First Unit In Monochem Complex

► Monochem, Inc., the company recently formed and jointly-owned by the Borden Co. and the United States Rubber Co., has begun construction of a $20 million chemical plant in Geismar, Louisiana. This is the first unit in a major chemical complex to be constructed on the 850 - acre site. Approximately 150 million pounds of vinyl chloride and 80 million pounds of acetylene will be produced annually, the output to be used by adjacent, individually-owned Borden and U. S. Rubber plants for the manufacture of other chemical products. The initial unit is slated for completion by the end of 1962.

Monochem also announced the formal organization of the company, which calls for the annual rotation of the presidency and executive vice-presidency between Borden and U. S. Rubber. Earle S. Ebers, a group vice-president of U. S. Rubber, has been elected president of the new firm. Augustine R. Marusi, president of the Borden Chemical Co., has been elected executive vice-president. Other officers of Monochem are: John V. Lynn, vice-president of operations; Everett L. Noetzel, treasurer; and Granville T. Pownall, secretary.

Representing U. S. Rubber on Monochem's eight-man board of directors are: Herbert M. Kelton, F. Dudley Chittenden, F. N. Taff, and Mr. Ebers. The Borden members are: Eugene J. Sullivan, William R. Moffitt, and Messrs. Marusi and Noetzel.

United Carbon Binder

► A loose-leaf binder, designed to hold a series of new bulletins which discuss rubber and carbon black behavior has been made available by the United Carbon Co., Inc., 410 Park Avenue, New York, N. Y. The new binder contains the first four issues of the bulletin, called "Techniques," which covers such subjects as: Styrene - Butadiene Rubber and Carbon Blacks and Shore Hardness Review; Carbon Black Loading in the 50-70 Shore A Durometer Range; Defining Carbon Black - Oil Ratio Requirements for Constant Mooney Viscosity; and Carbon Black-Oil Ratios for Base Compound Extension at a Constant Hardness Level.

Southern Rubber Group Holds Two Symposiums

► The Winter Meeting of the Southern Rubber Group was held on January 20 and 21 at the Statler Hilton Hotel in Dallas, Texas. The technical sessions, attended by 190 members, consisted of two symposiums.

The symposium on "Metallic Oxide Curing Systems in All Polymers" was moderated by Joe E. Stonis (C. P. Hall) and the panelists and their subjects were: William Deis (Merck), "Magnesium Oxides in Elastomers," and Marvin R. Coulter (American Zinc Sales), "The Production of Zinc Oxide and Its Use in the Compounding of Elastomers."

Grady Oaks (Southeastern Rubber) was the moderator of the symposium on "Retread Manufacture and Recapping Processes" and the panelists and their subjects were: Jack Jones (Gates Rubber), "Tread Rubber Manufacturing," and E. J. Wagner (Super Mold Corp.), "Retreading Problems."

The first panelist, Mr. Deis, stated that two general types of magnesium oxide are available to the rubber compounder, and they differ in purity, surface area, and reactivity toward acid. He explained that the heavy calcined designation refers to an inactive, and generally impure, type which was one of the first inorganic accelerators for natural rubber. It finds limited use in today's compounding. Ordinarily, he remarked, this type is used in highly loaded clay compounds to dry the stock and give denser cured products.

According to Mr. Deis, who is manager of Merck's rubber laboratory, the second general type is the active magnesium oxide which is a necessary and important compounding ingredient for many elastomers. The largest use of this type, he stated, is in the halogen-containing polymers. The speaker described the chemical and physical properties of magnesium oxide which are of importance to the rubber compounder, and discussed, in detail, the material's performance in such elastomers as neoprene, Hypalon, fluoroelastomers, chlorobutyl, butyl, and SBR.

In his discussion of zinc oxide, the next speaker, Mr. Coulter, stated that the material has been an important rubber compounding ingredient since the very beginnings of the industry. According to the speaker, who is rubber service director for American Zinc Sales, in the early days zinc oxide was used as an accelerator of vulcanization as were several other inorganic chemicals such as magnesium oxide, calcium oxide, and lead oxide.

Mr. Coulter pointed out that today the primary applications of zinc oxide in rubber compounding are: activation of the reaction of vulcanization; actual vulcanizing component in several elastomers; reinforcement of high quality white compounds; loading pigment in electrical insulating compounds; and loading pigment in heat-resistant compounds. He emphasized that of the many functions of zinc oxide in rubber, its use in promoting the reaction of vulcanization is certainly the most universal and most important.

Zinc Oxide Function

This function of zinc oxide, he stated, is essentially the same for most of the volume elastomers, specifically natural rubber and all forms of SBR, butyl, and nitrile rubbers. However, he said, the use of zinc oxides in neoprene and Thiokol is somewhat different. In those elastomers, it is the vulcanizing ingredient rather than the activator. The function of activating vulcanization is also the same whether the compounding form be dry rubber or latex.

The first speaker on the tread rubber symposium, Mr. Jones, remarked that some of the factors contributing to the problems that can be involved in the compounding and manufacturing of tread rubber are: uniformity,

Panelists for the Southern Rubber Group symposium on "Metallic Oxide Curing Systems in all Polymers." Left to right, William Deis (Merck), Marvin K. Coulter (American Zinc Sales), and Joe E. Stonis (C. P. Hall), moderator.

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Panelists for the Southern Rubber Group symposium on "Retread Manufacture and Recapping Processes". Left to right, Jack Jones (Gates Rubber), Ed Wagner (Super Mold), and Grady Oaks (Southeastern Rubber), moderator.

safe extrusion, long shelf life, pliability, cushion tack, balanced cure, crack resistance, and separation resistance. With these problems, in mind, the speaker pointed out that the compounder designing a new tread rubber faces a rather formidable assignment. First, he must decide if the polymer selected has a satisfactory rate of cure, and if not, can the rate of cure be adjusted by a satisfactory choice of acceleration.

According to Mr. Jones, after the initial compounding has been completed, the compounder must evaluate several factors of the tread rubber materials, such as: shelf life, changes during storage, wheel tests, fleet and commercial tests, tear resistance, curing variations, and shop tests.

Mr. Wagner, the final speaker, remarked that the development of a rereading matrix, in contrast to a new tire matrix or mold, is dependent upon a composite of dimensions. These dimensions are based upon worn-tire data that exist in the field. He explained that designing a matrix which, in effect, will process a range of casings of various dimensions and cure tread rubber to the prepared casings, poses such problems as: the radius of the worn tires, the construction of these tires, their diameter, cross-section, etc.

In addition to the determinations which are necessary for the calculations of proper dimensions for any particular matrix, Mr. Wagner stated that there is the problem of constantly appraising worn-tire data for given or existing matrices in the field. The speaker pointed out that unlike new tire molds which are designed for predetermined dimensions, and a green tire constructed to fit their dimensions, the retread manufacturer must work just the opposite. He must design his matrix to accommodate the dimensions of worn tires that are already in the field.

Considering Butyl Plant

► According to a recent statement by J. W. Crosby, president, the Thiokol Chemical Corporation is considering building a butyl rubber plant in cooperation with the Cities Service Co. Engineering studies are practically completed and a decision will be reached shortly. Mr. Crosby indicated that Cities Service would have the larger interest in the plant, which might involve a total capital outlay of some $25 million. He also stated that Thiokol Chemical has no immediate plans for equity financing to cover the butyl rubber operation or any other project currently under consideration. Thiokol Chemical was active in butyl rubber sales over a period of several years under a special arrangement with the Enjay Chemical Co. at the time that Petroleum Chemicals, Inc., was considering the production of butyl rubber.

Synthetic Group Names Committeemen

► The International Institute of Synthetic Rubber Producers, Inc., has appointed 11 persons to its SBR Division, of the North American Section, 16 to its Technical Committee, and 5 to its Statistical Committee. The committeemen are:

SBR Division—Chairman, I. W. Adams, Jr. (Copolymer Rubber & Chemical); Vice-Chairman, C. A. Hill (Firestone Synthetic); F. J. Sackfield (American Synthetic Rubber); John A. Kleinhans (General Tire); D. L. Matthews (Goodrich-Gulf); M. J. Rhoad (Goodyear); C. M. Tucker (Phillips); E. E. Gale (Polymer Corp., Ltd.) R. L. Kittle (Shell Chemical); A. G. Treadgold (United Carbon); D. E. Welch (U. S. Rubber).

Technical Committee—Chairman, F. W. Hannsgen (Shell Chemical); Vice-Chairman, E. S. Pfau (General Tire); Dr. Edward Carr (Firestone Synthetic); Paul Cornell (Goodrich-Gulf); K. G. Burridge (International Synthetic Rubber Co., Ltd.); Yorinori Yoshida (Japan Synthetic Rubber Co., Ltd.); Dr. W. W. Crouch (Phillips Chemical); D. E. McLellan (Polymer Corp., Ltd.); J. Van Der Bie (Shell International Chemical Co., Ltd.); John H. McKenzie (United Carbon); Dr. D. C. McCleary (U. S. Rubber); Dr. Thomas W. Boyer (American Synthetic Rubber); Dr. Clito Capitani (ANIC); Dr. F. Engel (Chemische Werke Huels); Dr. Ray Schultz (Copolymer Ruubber & Chemical); Merle Wendt (Goodyear).

Statistical Committee—Chairman, D. A. MacDougall (Firestone Synthetic); R. S. Faylor (Goodyear); L. Smith (U. S. Rubber); K. Greene (Goodrich-Gulf); C. R. Sykes (Polymer Corp., Ltd.).

Develops Release Paper

► A new release paper for rubber sheeting has been developed by Crocker, Burbank Papers, Inc., Fitchburg, Mass. Called Stick-Not, the product is designed for use as a casting paper for calendered rubber or as an interleaf for rubber blankets. It is said to provide easy release from sticky surfaces and to impart a high, smooth finish to the rubber. According to the company, Stick-Not has an unusually high tensile and tear strength and it can easily be die-cut or printed on the untreated side.

Industry Objects To Federal Tax Proposals

► Manufacturers of tires, tubes, and tread rubber have registered vigorous opposition to the excise tax increases which the Federal Administration has asked Congress to levy on those products. The tax increases are said to be designed to provide additional revenue for the construction of Federal highways. The proposed taxes call for an increase on highway tires from 8 to 10c per pound, up 25 per cent; inner tubes from 9 to 10c per pound, up 11 per cent and tread rubber from 3 to 10c per pound, up 233 per cent.

As part of the growing fight against the tax levies, the Oliver Tire & Rubber Co. of Oakland, Calif., placed a full-page advertisement in the March 20 issue of *The Wall Street Journal*, stating its position as a tread rubber manufacturer, and the Rubber Manufacturers Association proposed its own plan for paying for the Federal Highway Program without raising user taxes.

In its newspaper statement, Oliver Tire noted that as an alternative to the proposed tax levies, the Federal Government would increase its gasoline tax by 4½c per gallon. According to the company, this tactic of pitting the motorist against the tire and trucking industry does not appear as being extremely American in principle.

Defends Retreaders

In its defense of retreaders, Oliver Tire stated that by increasing tread rubber taxes an imbalance would be perpetrated which would strongly favor new tire sales over retreads, opening the way for a "take-over" by big business in one of the remaining strongholds of free enterprise. In addition, the 233 per cent increase would also be a direct blow to consumers who use retreads.

Oliver Tire expressed the feeling that it cannot be the intent of Government to penalize small independent businessmen, nor to impose additional costs on consumers least able to afford an added tax burden. To place a tax on economy and thrift, according to the company, is an assault on the American way of life.

The RMA's financing proposal was offered as an alternative to the Administration's request for a sharp increase in excise taxes on tire products and other highway use taxes to avoid a stretch-out or cut-back in the huge Federal roads building program.

Key to the rubber industry plan is the assignment of a limited amount of highway use taxes, presently diverted to meet the cost of other Federal expenses, to the highway program. Ross R. Ormsby, president of the RMA, speaking for the industry, told the Ways and Means Committee in its hearings on the finance problem, that over the next eleven fiscal years the Government would collect $57.924 billion in highway user taxes.

Mr. Ormsby pointed out that with $36.737 billion now ear-marked for the highway program, Congress has only to tag $4.902 billion of the remaining $21.187 billion of highway user taxes in the General Fund for construction needs to put the total highway program back on schedule. This would leave $16.285 billion of presently collected highway use taxes free in the General Fund to finance other Federal programs.

The RMA president told the Congressional Committee that taxes at the levels proposed, with increases ranging from 11 to 233 per cent, would impose an onerous burden on all of the industry's customers and would be certain to drive some truckers and retreaders out of business. He explained that 63 per cent of the proposed 25 per cent increase on tires and 61 per cent of the 233 per cent increase on tread rubber would come out of the pockets of passenger car owners. Another 16 per cent, in each case, would be paid by the owners of small trucks. According to Mr. Ormsby, these groups previously absorbed a 60 per cent increase in tire taxes and a brand new 3c per pound tax on tread rubber when the Federal Aid Highway tax schedule was adopted in 1956.

Mr. Ormsby questioned whether a plan which would raise the tax on retread rubber to 33.4 per cent of the current cost of that material might not put the price so high that low income motorists would be induced to stretch extra miles out of bald tires, possibly having an adverse effect on highway safety.

RMA Suggestions

During the hearings, the RMA suggested that Congress could "prevent further encroachment on the highway tax sources of the states and avoid additional burdens and inequities among highway users" by taking the following three steps to complete the Interstate Highway system on schedule and to maintain the ABC roads system:

Keep the current Highway Trust Fund items in the Fund at the current rates without changes as scheduled by the 1959 act.

Pay from the Highway Trust Fund the remaining Interstate and Defense Highway System costs of $30.854 billion, leaving a balance in the Fund of $5.883 billion for the ABC system.

Appropriate from the General Fund over the next eleven fiscal years $4.9 billion for the ABC system to meet its expanded 11-year total cost of $10.785 billion. This would leave in the General Fund an additional $16.225 billion in highway use taxes to be used for non-highway programs.

The RMA spokesman said this would have the advantages of providing funds for completing the system on schedule; enabling Congress to settle financing problems for the life of the program; avoiding an increase in user taxes from present levels, and freeing sufficient Trust Funds to provide 55 per cent of the monies needed to finance the ABC system on its presently expanded basis.

G. L. Hembree

Named by Thiele-Burgess

► G. L. Hembree has been appointed sales representative in the Midwest area for Thiele Kaolin Co. and its affiliate, Burgess Pigment Co., both of Sandersville, Ga. He will be located in Appleton, Wisc., and will handle their hydrous and anhydrous aluminum silicate pigments and kaolin clays. Mr. Hembree was formerly associated with Borden Chemical Co., the Sherwin-Williams Co., and DuPont.

Neotex-Loaded Treads Provide More Traction

► One year ago Columbian Carbon Co., New York, N. Y., announced an extension of its low modulus furnace blacks made from oil into the reinforcing tread blacks, specifically Neotex 100 in the HAF fineness range, Neotex 130 in the ISAF fineness range and Neotex 150 in the SAF fineness range. According to the company, these blacks, when incorporated into standard tread stocks, gave compounds with shore hardnesses from 4 to 6 points lower, modulus 500 to 700 pounds lower; and with equal tensile strengths to their higher modulus counterparts.

The Neotex blacks were specifically designed to provide SBR passenger tires with soft ride and low noise; as a channel black replacement; and for natural rubber off-the-road truck tires with superior chipping and cutting resistance. In the course of evaluating the Neotex carbons it was noticed that they gave excellent traction. To search this out fully, extensive traction tests following as closely as possible tests specified by the National Safety Council were conducted in both Canada and the United States.

Tests in Canada

The Canadian tests were conducted in the vicinity of Sundridge, Ontario about 30 miles south of North Bay. Ice traction and skid were investigated on Lake Bernard while snow tests were evaluated on the roads in the immediate vicinity.

A 1961 medium-sized passenger car carefully checked for alignment and braking and equipped with a governor set for 40 miles per hour was used in this study. The tires evaluated in this study made under full factory conditions were SBR rib passenger tires containing as the control Statex 125 (ISAF) and as the experimental, Neotex 130. Also evaluated were SBR snow tires having as a control Statex R (HAF) and as the experimental, Neotex 100. Two types of tests were used:

(1) The traction test consisted of starting the car with immediate and full acceleration as controlled by the governor from a stop, measuring the time to reach points 20 yards and 120 yards down the course; also noting the vehicle's exact speed in miles per hour as it crossed the 120 yard point.

(2) The skid test was conducted by starting the car into the test course at a set speed of precisely 20 miles per hour. At a designated point the hand or emergency brakes were set locking the rear wheels and the skid distance accurately measured in feet. A more accurate and straight skid test can be obtained by this method over that of locking all four wheels by the foot brake.

Hill traction tests were run as described above in (1). Also additional traction was determined by easing the car at a slow speed up the hill until traction was broken.

Summary

In summary, on clear ice the Neotex 130 rib tire and the Neotex 100 snow tires provided 20 per cent better traction than their respective ISAF and HAF controls. Clear ice skid tests were severe for all tires and somewhat erratic, but directional improvements in the range of 6 to 8 per cent for the Neotex were noted.

On hard packed snow on an ice base the Neotex 130 tires gave 20 to 25 per cent better traction than the ISAF control and 16 per cent better skid resistance. For the safety conscious driver this 16 per cent improvement at 20 miles per hour amounts to approximately 20 feet less skid.

On hill traction tests conducted on packed snow with an ice base and following procedures for traction testing previously outlined, the Neotex 130 rib tires and the Neotex 100 snow tires reached the 20 and 120 yard markers in excellent time and showed surprisingly good traction on the 8° slopes. Under the same conditions the ISAF rib and the HAF snow tire controls were unable to gain traction and therefore unable to get away from the starting marker.

Further hill tests were conducted on 15° slopes where not only did the Neotex 130 rib tires and the Neotex 100 snow tires climb the slopes from a slow running start but were able to come to a full stop midway up the slopes and restart again without breaking traction, Columbian Carbon reported. The ISAF rib tire and the HAF snow tire controls were unable to climb the hill, breaking traction even with a slow running start.

W. L. Ferguson

Named by Copolymer

►William L. Ferguson has been appointed sales representative for the Akron, Ohio, district of the Copolymer Rubber & Chemical Corp., Baton Rouge, La. A native of Muncie, Ind., Mr. Ferguson has had more than 11 years experience as a rubber compounder. He will share the Akron district with Skip Morris, now serving the area for Copolymer Rubber.

Seiberling Nytex Tire

► A tire combining two plies of nylon cord fabric and two plies of high-tenacity rayon fabric in its construction has been developed by the Seiberling Rubber Co., Akron, Ohio. The new tire construction has been trademarked Nytex, and the company says that it has applied for a patent on the idea of combining the two fabrics in a tire. The two nylon plies are on the inside of the tire, where greatest impact resistance is said to be needed. The rayon plies are on the outside, under the tread.

After testing the tires on the company's passenger tire test fleet at Fredericksburg, Texas, and in actual service on a large taxi fleet in an Eastern city, Seiberling claims that the tires retained their original strength better than either nylon or rayon tires after thousands of miles of service. The new construction will be introduced initially in Seiberling's first-quality Super Service line. The company reports that it is experimenting with other combinations of the two fabrics for premium tire use.

An index to Volume 88 of RUBBER AGE will be found on pages 177 to 180 of this issue.

"Slippery" Rubber Developed by Quantum

► Quantum, Inc., a research laboratory in Wallingford, Connecticut, has taken the "rub" out of rubber—and opened the way for a whole series of new products with potential applications to aircraft, automobiles, and other precision mechanisms. Through ingenious chemical treatment processes, it has produced rubber that is slippery to the feel and touch yet retains the elasticity and other desirable properties of natural or synthetic materials.

The significance of the development, according to Dr. C. M. Doede, president of Quantum, Inc., is that a new approach to the design and production of dynamic seals for precision mechanisms is made feasible. Conceivably, with further development, "slippery" rubber would make possible O-rings, Chevron seals, U-packings, and lip seals for rotary and reciprocating shafts that could function for long periods of time in the absence of applied lubricants.

Service Life Extended

A minimum expectancy, Dr. Doede said, is that the service life of many types of rubber seals in mechanical products can be greatly extended. The reason for this is that taking "rub" out of rubber eliminates the chief cause of seal failures.

According to Dr. Doede, "slippery" rubber may eliminate the grease leaks that sometimes occur around automobile wheel bearings—often with damage to the car's brakes—or the leaks that occur around shafts in washing machines, power tools, and other household mechanisms. It could also make possible completely airtight weather seals around windows and doors, yet permit "non-stick" opening of the door or easy sliding of the window.

Quantum, according to Dr. Doede, has much laboratory research ahead of it before "slippery" rubber will be available for sundry consumer products. But it has successfully made one rubber which compares with Teflon in its low-friction properties. Also, the laboratory, having worked out the basic principles, has many ideas for future improvements, and for tailoring "slippery" rubbers for specific uses.

The chemistry involved in the process is highly sophisticated. What Quantum does is "graft polymerize" chemically active "monomers or oligomers" to the surface of the elastomer (rubber). Then, with subsequent treatment, it converts the graft polymer to a "fluorinated" form. The hydrogen atoms in the surface of the rubber are replaced with fluorine atoms, and the resultant surface has a "low dipole force"—which means a low level of attraction with contacting surfaces.

"Slippery" rubber samples made to date have been produced from natural rubber sheeting by irradiation with ultraviolet light, grafting of methyl acrylate to the surface, subsequent hydrolysis to the corresponding acid forms, and fluorination of the acid with sulfur tetrafluoride. Numerous other methods are possible, and Dr. Doede believes that a wide variety of natural and synthetic rubbers with the desired amount of lubricity can be virtually tailored to order.

Quantum, Inc., is a commercial laboratory that specializes in new product development and materials engineering. It has gained distinction through its success in "molecular engineering"—or the taking of very practical problems and finding solutions to them through the application of molecular theory. Through this technique, it developed several ozone-resistant rubbers for the U. S. Army Engineers for use in arctic explorations and various plastics used in the missile program.

E. W. Varnum

New Quabaug President

► Edward W. Varnum has been elected president of the Quabaug Rubber Co., North Brookfield, Mass., succeeding Francis C. Rooney who has been named chairman of the board of directors. Mr. Varnum has been associated with Quabaug Rubber for the past 24 years, and has served as vice-president and general manager since 1948. In addition to his new duties as president, he will continue to serve as general manager. The company also announced that Herbert T. Mason, former chairman and president of Quabaug, will continue to serve as treasurer, and William Matfess and John B. Rapp, Jr., have been elected to the board of directors.

► National Distillers & Chemical Corp. is building a 60 million pound per year linear polyethylene facility adjacent to its conventional polyethylene unit at Houston, Texas.

Forms Rubber Division

► Eberhard Faber, Inc., Wilkes-Barre, Penna., well-known in the writing instruments field, has formed a new Eberhard Faber Industrial Rubber Products Division in the latest of a series of diversification moves. The company states that experiments preparatory to entering the industrial rubber field have been underway for five years. The new division will design and manufacture molded rubber products for the automotive and aircraft industries. Eventually it will extend its operations into other fields, the company states. Willard T. Davis, formerly vice-president of both the Linear Corp., Dallas, Penna., and Sun Rubber Co., Barberton, Ohio, has joined the company as sales manager of the new division.

Goodyear Names Evans

► Frank R. Evans, previously general manager of the Shoe Products Division of the Goodyear Tire & Rubber Co., Akron, Ohio, has been appointed general manager of the company's Foam Products Division. Mr. Evans joined Goodyear in 1926, serving as dispatcher, supervisor, and foreman in the Production Control Department until 1929, when he was named division superintendent at Goodyear-Australia. He returned to the United States in 1933, and was transferred to the company's shoe products plant at Windsor, Vermont, in 1937 as division superintendent. Various assignments at the Windsor plant led to his appointment in 1954 as general manager of shoe products.

URW Proposes Goals For Economic Security

► A program of sweeping economic goals aimed at security for rubber workers in an age of automation was unanimously approved by the United Rubber Workers Union at a meeting on March 15 and 16 in Cleveland, Ohio. The URW voted to seek more generous Supplemental Unemployment Benefits (SUB), a fund to benefit workers laid off through technological change, and protection of skilled workers against the contracting out of work normally performed by them.

Nine goals are included in the economic security program adopted by 160 union delegates representing 104 locals with a total of 180,000 members. The economic goals are:

A universal 30-hour work week with no loss in pay;

Early retirement with no reduction in the normal pension and, in some cases, substantially higher pension amounts;

Strict limitations on overtime to "unusual and essential situations";

Company-wide recall rights to give laid-off employees a chance to be hired at other URW-organized plants of the company. A rubber worker accepting a job at another plant would carry with him his seniority for pension and vacation;

Opportunity for a laid-off rubber worker to be hired at a new plant built by the company, maintaining seniority;

Expansion of Supplemental Unemployment Benefits (SUB) from its present 26 weeks to 39 weeks;

Company-paid training for new work responsibilities;

An automation fund based on company contributions to pay the cost of the URW automation proposals;

Advance information from the company on projected changes due to automation.

The URW also called for a general wage increase in 1961 with wage negotiations being reopened anytime with 60 days notice, and supported a plan to promote its skilled trades program. It also endorsed the following additions to its SUB program:

Increase the amount of the combination of unemployment compensation and SUB to 70 per cent of take-home pay plus $3 per week for each dependent. SUB and unemployment compensation now are set up to equal 65 per cent of the weekly wage along with $2 for each of the first four dependents;

Raise maximum SUB benefits to $35 for laid-off employees with unemployment compensation rights and $65 for those without. Also bring the minimum SUB payments to $7 a week;

Extend SUB in states where emergency unemployment compensation is in force.

The URW program for skilled tradesmen proposes a contract agreement prohibiting work from being given to outside contractors without approval of the URW local involved, and new apprenticeship programs and expansion of ones now working.

In its views on a shorter work week, the URW feels that it would provide extra jobs in the rubber and allied industries. The union concedes that new technology reduces physical effort, but it blames automation for an increase in "tension, responsibility output, and other factors."

According to URW, the economic security program, except wages, will serve as a guidepost in its contract negotiations with the rubber companies. Wage discussions are not scheduled at present, but are expected later in the year under wage re-opener clauses in contracts.

The union began contract negotiations on March 20 with the Firestone Tire & Rubber Co. in Akron, Ohio, and the Goodyear Tire & Rubber Co. in Dayton, Ohio. Present agreements with both companies expire April 15. Contract negotiations with the General Tire & Rubber Co. began on April 5 in Akron. The present agreement with General Tire ends on May 1. There are 41,000 URW members covered by contracts at Goodyear, Firestone, and General Tire.

In addition, the URW served notice on the Seiberling Rubber Co. that it wants to negotiate a new agreement. The present contract runs out on May 1, but no date has been set for the start of bargaining.

It is expected that contract talks will be scheduled with the B. F. Goodrich Co. to replace the agreement that expires on June 9.

SORG Honors Teaching Staff

► Members of the teaching staff of the Southern Ohio Rubber Group were given a dinner on February 21, 1961, in appreciation for their effective and efficient teaching of a two-credit course in Basic Rubber Technology at Sinclair College in Dayton, Ohio. Attending the dinner were, left to right, back row: E. L. Doria (Inland Mfg.); R. Alig; R. J. Hoskins (Inland Mfg.); E. N. Epioltis (Inland Mfg.), chairman of the SORG Education Committee; H. G. Gillette (Precision Rubber Products); E. N. Cunningham (Precision Rubber Products); P. A. House (Wright Air Development Center); E. R. Bartholomew (Wright Air Development Center); and R. G. Spain (Wright Air Development Center). Front row, left to right: J. E. Feldman (Inland Mfg.); S. L. Brams (Dayton Chemical Products); R. G. Hornig (Dayton Tire & Rubber); and J. M. Kelble (Wright Air Development Center).

Course lecturers not present were: F. W. Gage (Dayton Chemical Products); E. L. Davis (Dayton Rubber); K. C. Tregillus (Vernay Laboratories); J. L. Fitzgerald (Premier Rubber); W. Frye, H. E. Schweller and R. Thome (Inland Mfg.).

Lamb Loses Libel Suit Against Seiberling

► A $500,000 libel suit filed by Edward Lamb, a director of the Seiberling Rubber Co., against J. P. Seiberling, president of the company, was dismissed on March 20, 1961, in Common Pleas Court in Akron, Ohio. In handing down the decision, Judge C. V. D. Emmons said that Mr. Lamb's petition was "sham and frivolous," and ordered the "motion to strike the same from the files . . . be sustained."

Mr. Lamb filed the libel suit against Mr. Seiberling on March 8, 1961, charging that a statement about him made by the company president in a deposition given on January 24, 1961, in Wilmington, Del., was untrue.

The January 24 deposition made by Mr. Seiberling was in connection with a suit filed earlier by J. Eugene Farber, Mr. Lamb's attorney and his nominee on the Seiberling board of directors, seeking a new Seiberling stockholder list. Mr. Seiberling, at the time the suit was filed, called it "just one more in a series of harassing attacks against the management which are part of Mr. Lamb's efforts to get control of the Seiberling Rubber Co."

Seiberling's Comments

In commenting upon Mr. Lamb's conflict of interest lawsuit against 11 Seiberling directors, and his other attacks, J. P. Seiberling said that they are part of a "proxy contest by default." He charged that Mr. Lamb, "through propaganda tearing down management," is trying to keep stockholders from voting their proxies at the May 15 annual meeting, thereby giving Mr. Lamb's block of shares a larger proportion of the total stock voted, and more directors than he is entitled to elect.

Mr. Lamb's charges in the lawsuit are "malicious, highly misleading, and substantially false," Mr. Seiberling said. "They will be met in court, properly refuted, and we are confident that all will be dismissed."

Mr. Seiberling remarked that he regards Mr. Lamb's conduct as highly irresponsible, and is seriously considering additional legal steps to indemnify the company for damages from this attack.

One of Mr. Lamb's charges was that Paul A. Frank, president of the National Rubber Machinery Co., and a Seiberling director, sold the company $400,000 worth of truck tire machines in 1960 without competitive bids. According to Mr. Seiberling, comparative studies were made of two machines, including one of National's, and Mr. Lamb voted in favor of the study. Later, when the Seiberling board voted to buy the National machines, Mr. Lamb's nominee voted in favor of the action in Mr. Lamb's absence. Mr. Seiberling added that total purchases from National in 1960 were $160,000.

Mr. Lamb also had charged that E. T. Herndon, partner in Eastman Dillon, Union Securities & Co., "while a Seiberling director," had caused the company to pay underwriting fees to his firm. In answer to this charge, Mr. Seiberling pointed out that the company arranged in 1958 for a financing program completed in 1959—and Mr. Lamb and his nominees voted for it, and also voted to appoint Eastman Dillon. Mr. Herndon was not affiliated with Seiberling at that time, and did not become a director of the company until nine months after the financing was completed, Mr. Seiberling stated.

According to the Seiberling president, "this is just a sample of the harrassment we are required to take as a consequence of Mr. Lamb's determination to control the company." He said that Mr. Lamb's "castigations" of directors, his widely-publicized prediction of a Seiberling financial loss, and his lawsuit were part of the program to "undermine the confidence" of stockholders.

Letter to Stockholders

In a letter to stockholders on March 8, 1961, Mr. Seiberling urged them to study the record of Lamb Industries, Inc., which Mr. Lamb took over following a threatened proxy fight in 1954, "in order to judge his ability as a manager." A tabulation attached to the stockholder letter showed operating results for the Lamb company from 1950 through 1959, including five years under the former management and five years under Mr. Lamb's management.

Mr. Seiberling remarked that "despite seven changes in the office of president and a succession of changes of directors in those five years, we believe the record of Lamb Industries to date hardly qualifies it as an example for Seiberling, as Mr. Lamb suggested."

Named by DuPont

► Willard F. Sheldon has been named an assistant director of the Sales Service Laboratory of the Elastomer Chemicals Department of E. I. du Pont de Nemours & Co., Wilmington, Del. In his new post, he will be concerned primarily with development activities. Mr. Sheldon received his B.S. degree in chemical engineering in 1939 and his M.S. degree in 1940 from the University of Michigan. He joined DuPont in 1940 as a field engineer in the Engineering Service Division at the Chambers works in Deepwater Point, N. J. In 1948 he became group supervisor for the division at the Jackson Laboratory, and the following year transferred to the Organic Chemicals Department as head of the Jackson Laboratory Engineering Division. In 1953 he became technical superintendent at the Beaumont, Texas, works, and continued in that position when the plant was transferred to the newly-organized Elastomer Chemicals Department, and became superintendent of production in 1959. Mr. Sheldon is a member of the ACS Rubber Division.

W. F. Sheldon

► Emery Industries, Inc., Cincinnati, Ohio, has developed a new, lighter-colored commercial grade of dimer acid, called Empol 1018, for use in polyesters, polyamides, esters, ester-based urethanes, and epoxy ester coatings.

Approves Merger Plans

► Directors of the Baldwin Rubber Co., Pontiac, Mich., Montrose Chemical Co., Newark, N. J., and the Centlivre Brewing Corp., Fort Wayne, Ind., have approved a proposed merger of the three firms. Action was taken at three independent meetings of the boards of directors in February. The surviving company will be known as the Baldwin-Montrose Chemical Co. The joint announcement of the board chairmen pointed out that the merger is subject to an Internal Revenue Service tax ruling. Promptly thereafter, the merger terms will be submitted to shareholders of all three companies for approval. Under the merger terms agreed on by the three boards, common stock shareholders of Montrose and Baldwin will receive convertible preferred shares of Baldwin-Montrose Chemical, while Centlivre shareholders will receive common shares of the new firm.

Goodrich-Gulf Licensee

► Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio, has granted a license to the Shell Chemical Co., Ltd., London, England, for the manufacture, use, and sale of its *cis*-polybutadiene synthetic rubber in the United Kingdom. The agreement between Goodrich-Gulf and Shell Chemical, one of the Royal Dutch Shell companies, grants Shell a license under Goodrich-Gulf patents. Shell already holds licenses, under patents held by Professor Karl Ziegler of Germany, to use catalysts developed by him in the manufacture of polybutadiene and polyisoprene rubbers in the United Kingdom.

Expanding Research Unit

► Goodyear Tire & Rubber Co. is spending $1.5 million to expand its research facilities at Akron, Ohio. Construction is underway on a three-story wing which will enlarge its present research laboratory by 30 per cent. The addition is expected to be ready for occupancy by the end of 1961. The company reports that the new wing, containing 25,500 square feet of floor space, will be used to expand the laboratory and office facilities of the present staff and to house additional chemists, physicists, and technical assistants who will be engaged in rubber and plastics research.

Participants in the New York Rubber Group's March 24 technical program. Left to right, H. E. Wieditz (Universal Oil Products); Ralph F. Wolf (Natural Rubber Bureau); Peter Lumb (Polymer Corp., Ltd.); and Henry J. Peters (Bell Laboratories), chairman of the group.

New York Hears Three Papers

► The New York Rubber Group held its Spring Meeting on March 24, 1961, at the Henry Hudson Hotel in New York City, with over 250 members and guests in attendance. Three papers were presented at the technical meeting: "Resistance to Degradation in the Butyl Network" by Peter Lumb, director of technical services for the Polymer Corp., Ltd.; "Additional Studies on the Application of Antiozonants in Rubber" by H. E. Wieditz of Universal Oil Products Co.; and "Recent Developments in Natural Rubber" by Ralph F. Wolf, director of technical advisory services for the Natural Rubber Bureau.

Henry J. Peters (Bell Laboratories), chairman of the group, announced that the annual outing will be held on June 1 at Old Cider Mill, Union, N. J., with A. M. Gessler (Esso Research & Engineering) serving as general chairman, and that the annual golf outing, with William R. Hartmann (Laurie Rubber Reclaiming) serving as chairman, will be held on August 10 at the Scotch Plains and Echo Lake Country Clubs in Scotch Plains and Westfield, N. J. On October 20 the New York, Philadelphia, and Connecticut Rubber Groups will participate in a joint technical meeting at the Henry Hudson Hotel in New York City, with Ralph DeTurk (Cooke Color & Chemical) serving as chairman.

It was also announced that Lloyd Shepherd, a student at the University of Akron, is the first recipient of the New York Rubber Group's scholarship award. Mr. Peters also informed the membership that the Five Year Membership Directory of the New York Rubber Group will be issued during 1961.

The first speaker at the technical meeting, Mr. Lumb, stated that by means of network density measurements the resistance of sulfur- or quinoid-cured butyl rubber to degradation on aging in air increases rapidly with increasing polymer unsaturation. He attributed this to an increase in the rate of oxidative cross-linking relative to the rate of scission. Resin-cured vulcanizates do not show this dependence, the speaker remarked, and it is postulated that the resin functions as an antioxidant as well as a cross-linking agent.

Mr. Lumb explained that the vulcanizates are almost completely stable in water at 177°C., which shows that hydrolytic scission does not occur and that thermal degradation is negligible at this temperature. According to the speaker, simultaneous exposure to air and water results in a rapid degradation at the surface. He presented data on various resin curing systems to illustrate the influence of non-butyl ingredients on the air aging, water absorbtion, and surface degradation of these vulcanizates.

The second speaker, Mr. Wieditz, whose co-author was W. L. Cox,

informed the group that the antiozonant requirements of compounds containing the recently developed types of carbon blacks, which are claimed to be oil furnace replacements for channel blacks, are of about the same magnitude as the finer particle sized standard furnace blacks, such as the HAF, ISAF, and SAF types. He stated that work with antioxidant-antiozonant combinations has shown that although most antioxidants do not possess antiozonant properties, it is possible to supplement the ozone protection by selectively choosing an antioxidant for use in conjunction with the antiozonant.

Work with Reclaim

Mr. Wieditz stated that work with reclaim in an antiozonant-containing SBR sidewall type compound has indicated that one-half the SBR polymer may be replaced with reclaim with no serious loss of ozone resistance. In regards to the stereo-specific polymers, he pointed out that polyisoprene is a little more difficult to protect against ozone attack than is the natural rubber compound. According to Mr. Wieditz, polybutadiene requires somewhat less antiozonant than natural rubber for an equal degree of ozone protection, and appears to have an antiozonant requirement intermediate with respect to SBR and natural rubber.

According to Mr. Wolf, the final speaker on the program, production of natural rubber is increasing every year and the Hevea tree is still the most economical rubber producing factory in the world. He pointed out that natural rubber continues to be an extremely important raw material in the United States, with nearly 500,000 tons, worth $400 million, used in 1960.

Technically Classified Rubber

Mr. Wolf remarked that renewed interest is being shown in technically classified rubber after several years of being dormant, and a partially purified crepe, which has less than half the ash and protein content of normal rubber, is now commercially available. According to the speaker, the superior processing rubbers and PA-80, the concentrated form of these cross-linked modifications, have proven to be important aids in processing both natural rubber and SBR compounds. He informed the group that natural rubber's good low temperature resistance is further enhanced by isomerizing about 6 per cent of the rubber from the *cis* to the *trans* form, and this can be done in the user's factory.

According to Mr. Wolf, graft polymers of natural rubber and methyl methacrylate have unusual physical properties. He explained that recent work indicates that graft polymers are excellent adhesives between rubber and leather, textiles, polyvinyl chloride, and other plastics and metals. Mr. Wolf reported that work will be renewed on natural rubber-carbon black masterbatches, and on oil extension of natural rubber.

Dr. Godfrey L. Cabot (right), founder of the Cabot Corp., is congratulated upon his 100th birthday by Owen J. Brown, Jr. (left), vice-president and director of sales for Cabot.

G. L. Cabot Centennial

► Dr. Godfrey Lowell Cabot, founder of the Cabot Corp., Boston, Mass., celebrated his 100th birthday on February 26 with members of his family and members of the Cabot board of directors and their wives. The centennarian, a great-grandfather of 29, as well as an industrialist and philanthropist, read hundreds of telegrams and letters, including messages from Dwight D. Eisenhower and President John F. Kennedy.

Among the many gifts presented to him was a scroll signed by Cabot employees throughout the world, and a plaque and Paul Revere bowl from the company. A general company celebration was held at Boston office headquarters the following day in honor of the founder who has guided the company for 71 years.

Dr. Cabot was born in Boston, Mass., in 1861, and attended the Massachusetts Institute of Technology for two years before entering Harvard University. He graduated from Harvard, magna cum laude, in 1882 with an A.B. degree in chemistry. His business career started that same year in Buffalo Mills, Penna., with one small carbon black plant. The organization, 71 years later, comprises carbon black plants in the United States, Canada, England, France, Italy, and Argentina, and co-ownership of plants in Australia and The Netherlands.

► Naugatuck Chemical has made available a four-page brochure entitled "Where to Use Reclaimed Rubber."

ASTM D-24 Proposes Bulk Sampling Methods

► Proposed tentative methods for sampling bulk shipments of carbon black are being letter balloted for approval by ASTM Committee D-24 on Carbon Black. The proposed methods are based on the results of an experimental sampling program conducted by a task group of Subcommittee 5 on Sampling, consisting of carbon black producers and consumers.

A statistical report of the results obtained by the task group accompanied the proposed methods as explanatory data instead of including it in the procedure. This report covers the operation of the experimental sampling and per cent fines (ASTM D-1508-57T, Test for Fines Content of Pelleted Carbon Black, 20-minute Ro-Tap) testing program established by five manufacturers and three consumers on five different grades of carbon black—HAF, FEF, FF, ISAF, and GPF. Tables containing data on samples taken in seven tests on per cent fines, and an analysis of variance are included in the report. The proposed "Tentative Methods for Sampling Bulk Shipments of Carbon Black" follow:

Scope—1. These methods outline procedures for the sampling of bulk shipments of carbon black in three-compartment hopper rail cars but the same principles can apply to sampling compartmented bulk highway trailers as well. These methods are for use in obtaining representative samples of the carbon black in each compartment or in the entire hopper car. These samples may be used to obtain the average quality and the maximum and minimum variations. Note 1: The tests to be made on these samples thus obtained shall be determined by the purchaser and the manufacturer.

General—2. (a) Sampling of bulk shipments of carbon blacks is of utmost importance since the location and number of samples taken by different laboratories has a tremendous effect on the agreement of test values obtained. The sampling of bulk shipments of carbon blacks shall be based on probability of random sampling (Note 2). By definition, random selection is a predetermined effort to obtain samples that will give maximum, minimum or average test values representative of the quality of the lot with a minimum number of samples.

Note 2: For detailed information on probability sampling and selection of sample size, see the Recommended Practice for Probability Sampling of Materials (ASTM Designation: E 105) and the Recommended Practice for Choice of Sample Size to Estimate the Average Quality of a Lot or Process (ASTM Designation: E 122).

Sampling Procedure—5. (a) A minimum of one quart sample shall be withdrawn from each sample port after first withdrawing at least a one gallon sample and discarding. (Note 3) The sample ports are located on each side of each compartment in a three-compartment bulk hopper rail car. The six samples thus obtained may be tested singly or composited as agreed upon by the purchaser and manufacturer (Note 4).

Note 3: Larger samples are recommended. Pelleted carbon blacks tend to separate. Tests on pellet quality may be erroneous due to local or spotty condition.

Note 4: The limitations given are believed to be necessary for pellet quality tests; otherwise, a sample may be taken from any convenient location.

Sample Preparation and Handling — 6. (a) Store the samples in airtight glass or metal containers until tests are made.

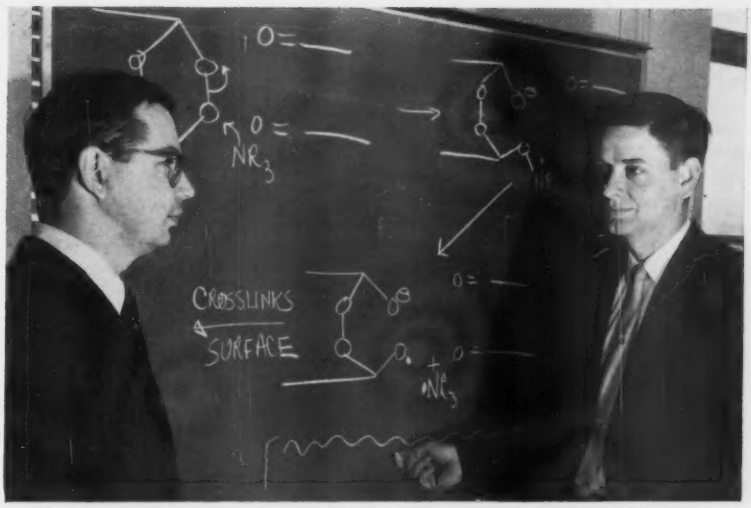
(b) Handle samples collected for the determination of pellet quality with discretion to avoid pellet breakdown.

(c) If individual samples are taken for testing independently, pass each sample through a single stage riffle type sample splitter at least twice in order to prevent stratification. This is particularly important if pellet quality tests are to be made on the sample. It is highly recommended to calculate the mean quality of the shipment from the individual samples. This will provide mean quality and maximum and minimum variations.

(d) If individual samples are composited, they must be passed through a single-stage riffle type sample splitter at least 3 times. Three or more determinations must be made on composited samples.

Report—7. (a) The specific test to be made on the samples obtained using this method shall be agreed upon between the purchaser and manufacturer. The specific details of each test method are described in appropriate ASTM Methods used for testing carbon black.

(b) The report shall include the following information: (1) The number of sample ports sampled; (2) The location of the sample ports; (3) Individual samples — averaged or single; (4) Composited samples —compartment or car; (5) Size of samples.



Dr. Robert W. Murray (left) and Dr. Paul R. Story (Bell Laboratories) discuss a key step that they believe takes place in an elastomer or natural rubber protected by an antiozonant.

New Theory on Antiozonants

► Robert W. Murray and Paul R. Story of the polymer research and development group of Bell Telephone Laboratories, Murray Hill, N. J., have developed a new theory which may enable scientists to understand the basic mechanisms of how some antiozonants prevent physical changes caused by ozone in certain elastomers and natural rubber. According to this theory, which was presented in a paper at a meeting of the American Chemical Society on March 24 in St. Louis, Mo., protection is obtained by a process which cross-links the surface of the material, thus making it impervious to further ozone attack.

It is believed that cross-linking occurs through radicals produced in a reaction between an amine antiozonant and peroxides created in the rubber by ozone. This new mechanism should allow industrial technologists to extend the range and applications of chemical antiozonants to inhibit environmental effects of ozone on materials. An experimental program to determine the validity of the proposed new mechanism is now underway at the Bell Laboratories.

Ontario Hears Nichols On Polyisoprene

► The Ontario Rubber Group held a joint meeting with the Wellington-Waterloo Section of the Chemical Institute of Canada on March 14, 1961, at the Walper House in Kitchener, Ontario, Canada. Dr. P. M. Nichols, of the U. S. Rubber Co., Detroit, Mich., was the guest lecturer at the joint meeting and his subject was "Processibility of Synthetic Polyisoprene."

Dr. Nichols stated that commercial polyisoprene rubber has been found similar to natural rubber in many ways, superior in other respects, but markedly different from natural rubber in certain processing qualities. He compared polyisoprene with natural rubber from the standpoint of processing and showed the relationship of processibility to polymer properties measurable in the laboratory.

According to the speaker, polyisoprene differs from natural rubber in five processing characteristics: mill roll bagginess, crumbling, surface scaling, moldability, and tack strength. He described laboratory tests which measure the extension and compression stress - strain and stress-relaxation properties of raw polymers. He also gave quantitative values for set, raw tensile, elastic stress component, and viscous stress component, and qualitatively estimated the tendency to crystallization.

Dr. Nichols pointed out that correlation of these tests with processing shows a relationship between bagginess, elastic stress component, and set; crumbling, surface scaliness, and raw tensile strength; moldability, stress relaxation, viscous flow component, and set; and tack strength and crystallization. The utility of these tests, he pointed out, is demonstrated where conventional testing techniques are inadequate. An example, he stated, is the estimation of viscosity at temperatures where internal shearing makes Mooney viscosity measurements meaningless.

Petro-Tex Enlarges Office

► Petro-Tex Chemical Corp. is building a two-story addition to its office and laboratory building in Houston, Texas. The addition, being built at a cost of $300,000, is expected to be completed in August, 1961, and will give the firm an additional 44,000 square feet of laboratory space.

Examples of small urethane rubber parts which can be made by extrusion or injection molding, using Mobay's recently-developed Texin resins.

New Urethane Resin Developed

Mass production of urethane rubber parts, previously difficult to obtain defect-free in volume by the casting method, is now said to be possible with the development of a new urethane resin called Texin. Developed by Mobay Chemical Co., Pittsburgh, Penna. Texin can be either extruded, injected or transfer molded to produce small rubber and rubberlike end products. The urethane resin is a fully compounded, partially-cured formulation of isocyanate, polyester, and chain extender, and is supplied in the form of a granular solid.

The outstanding physical properties of the new urethane rubber are said to be its exceptional toughness and resistance to abrasive wear, oil and solvents, plus its unique combination of hardness with elasticity.

The resin is being produced in two hardness grades which are measured in the cured or finished form. The grades are Texin 280-A and 192-A —the hardness being indicated by the last two digits in the suffix number. Texin 280-A is specifically designed for extrusion purposes while 192-A is suitable for injection and extrusion molding.

The minimum typical properties of Texin 280-A and 192-A are shown in Table I. Preliminary laboratory work by Mobay indicates that molecular orientation is also possible in extruding Texin 280-A. A certain

TABLE I—MINIMUM TYPICAL PROPERTIES OF TEXIN

Properties	280-A	192-A
Specific gravity	1.25	1.25
Bulk factor	2.7	2.7
Hardness, Shore A	80	92-94
Shore D	—	44-45
Tensile strength, psi (ultimate)	5500	4400
Elongation, %, at break	600	600
Tensile modulus, psi:		
100%	650	1160
200%	900	1550
300%	1500	2050
Elongation set, %	30	45
Tear strength*, lbs/minimum	—	300

* Tear strength by Federal Specifications, FTMS-601 M-4221.

amount of orientation is obtained by first allowing the material to air cool slightly before drawing. A greater amount of orientation is accomplished by heat curing (24 hours at 110°C.) the material while it is held under tension, with greater orientation occurring at higher elongations during the cure.

In Table II data are listed for individual samples extruded from Texin 280-A and cured by the methods indicated to effect molecular orientation and thus ultimate physical properties of the extrudates. The curing times and temperatures are experimental values and not necessarily optimum.

Experimental tests by Mobay reveal that since the shrinkage of the material is too great, Texin 280-A is not recommended to be used for molding at present. Although Texin 192-A is a molding grade, it is capable of being extruded. However, it is more difficult to extrude than 280-A in that the material has very low strength immediately after extrusion and while still warm. Ultimate strength of extrudates is developed by post-curing at 110°C. for 12 to 24 hours.

Only a limited amount of work has been devoted by Mobay to date to transfer molding of Texin 192-A. The molding conditions arrived at are: Temperature—350° to 375°F.; Pressure—300 to 500 psi.

Color Blending

Preliminary results indicate that colored urethane rubber parts may be easily obtained via injection molding, simply by blending a dyestuff with Texin 192-A. The dyestuffs used were dry blended thoroughly at a concentration of 0.1 to 0.2 weight parts per 100 parts of Texin and the mixture was extruded and pelletized to give a homogeneously colored product. Tests indicate that similar blending can probably be done using a dispersion type nozzle on an injection press. The dyestuffs may be dry blended with Texin 280-A prior to extrusion to give colored extrusions. If a white color is desired, 1 to 2 weight parts of titanium dioxide may be added to 100 weight parts of Texin.

Texin 280-A has been extruded, reground and reprocessed for a total of three cycles with no difficulty experienced. It was not necessary to change temperatures in order to extrude satisfactorily on the laboratory extruder. Texin 192-A has been reprocessed three times on an injection molder without the moldability or physical properties being affected, the company reports.

Although the Texin resins are partially-cured polymers, the end point for storage life has not yet been determined, but is said to be ample. At the Mobay laboratory, Texin 280-A has been extruded satisfactorily after standing five months in sealed containers at room temperature. The physical properties of the extrudates were essentially the same as those from samples obtained from the fresh material. Texin 192-A also has been molded satisfactorily after standing seven weeks in sealed containers at room temperature. For both grades the decomposition temperature range is about 450° to 460°F., and degradation can occur at lower temperatures over longer periods of time.

The urethane parts which it is claimed can now be economically produced include grommets, heel lifts, seals, gaskets, gears, hosing, tubing, and cable jacketing. Liquid casting of urethane rubber will still be used for producing large-size items such as industrial truck tires or parts that would require a heavy outlay in mold design costs.

TABLE II—TYPICAL PHYSICAL PROPERTIES OF TEXIN 280-A EXTRUSIONS

Cure method*	A	B	C
Monofilament diameter, inches	0.074	0.040	0.017
Tensile strength, psi.	4900	17,000	27,000
Elongation, % (ultimate)	600	265	210
Elongation set, %	78	—	—
Tensile Modulus, psi:			
100%	810	1800	12,800
200%	1150	8200	25,500
300%	1700	—	—

* A: Extruded as a monofilament and cured at 110°C. for 72 hours; B: Cured as in A, but then stretched 400 to 500% at 25°C. for one minute, released, and tested one week later; C: Stretched 400 to 500% and then cured while in the stretched state at 110°C. for 72 hours.

Offering Rubber Course

► The Institute of Rubber Research of the University of Akron is offering a special, intensive five-day course on elastomers from June 12 through June 16. The course will consist of 25 hours of lectures and 15 hours of laboratory, and the topics to be covered include:

Chemistry of Natural Rubber, by Dr. G. Stafford Whitby.

Chemistry of Synthetic Rubber, by Dr. Maurice Morton.

Physical Behavior of Elastomers: Elasticity Theory; Relaxation and Creep, by Dr. Alan N. Gent.

Physical Behavior of Elastomers: Dynamic Properties, by Dr. Kenneth W. Scott.

Physical Behavior of Elastomers: Tensile Strength; Reinforcement, by Dr. Fred J. Bueche.

The course will be limited to 25 persons, and further information may be obtained from Dr. Maurice Morton, Institute of Rubber Research, University of Akron, Akron, Ohio.

IRI Plans 1962 Meeting

► The Institution of the Rubber Industry will hold its Fourth International Rubber Technology Conference on May 22 to 25, 1962, at Church House in Westminster, London, England. The conference will consist of four main sections: (1) Latex Science and Technology; (2) General Rubber Technology — Equipment, Processing, Compounding, and Evaluation; (3) Rubber Science—Chemistry, Physics, Testing, and Analysis; (4) Materials and Products — Rubbers, Textiles, and Ingredients.

The papers to be given at these sections will be made available as preprints to those attending the conference. Each author will be given from 10 to 15 minutes to summarize his paper in order to leave ample time for discussion.

The IRI is contemplating holding an exhibition of new materials and testing equipment, which would also be held at Church House.

Names in the News

Andrew W. Williams has been appointed manufacturing manager for the Chemstrand Corp., Pensacola, Fla.

Donald T. Beldock has joined the Fabrex Corp. as president of its new subsidiary, the Gerry Corp., New York, N. Y.

Edward A. O'Neal, Jr., president of the Chemstrand Corp., has been elected to the board of directors of Monsanto Chemical Co.

Robert W. Marchand, director of housewares sales, will be responsible for the sales program of Rubbermaid, Inc., Wooster, Ohio.

W. A. Jarvey, previously manager of plasticizers within the Industrial Chemicals Division of Archer-Daniels-Midland Co., Minneapolis, Minn., has been appointed manager of the newly-formed Plasticizers Department.

S. R. Zimmerman, a director and vice-president of Raybestos-Manhattan, Inc., Passaic, N. J., has been appointed as executive vice-president of the company.

John E. Dereich, formerly associated with the Westinghouse Electric Corp. as engineer in their Advanced Development Engineering Department, has joined the staff of the Technical Division of the Neville Chemical Co., Pittsburgh, Penna.

Laurence Kogos, vice-president of the Vinyl Division of Farrington Texol Corp., Walpole, Mass., has been promoted to executive vice-president of Farrington Mfg. Co.

Dr. Richard D. Gilbert, manager of synthetic latex research and development for the Naugatuck Chemical Division of U. S. Rubber Co., Naugatuck, Conn., has been named 1961 chairman of the New Haven Section of the American Chemical Society.

Harold H. Burrows, senior vice-president of rubber sales with the Manhattan Rubber Division of Raybestos-Manhattan, Inc., Passaic, N. J., has retired after 45 years with the company.

Howard E. Drew, formerly assistant factory manager of the Indianapolis, Ind., tire plant of U. S. Rubber Co., has been appointed factory manager of the company's Chicopee Falls, Mass., tire unit, succeeding **S. E. Harrison,** who is on a special assignment in Europe for the International Division.

H. D. Kinsey has been elected a vice-president of the Union Carbide Corp., New York, N. Y., and **Paul L. Alspaugh** becomes president of Union Carbide Olefins Co., succeeding Mr. Kinsey.

John G. Eisenhart, formerly sales representative for the Synthetic Division in the Philadelphia, Penna., area, has been named sales promotion manager of the Firestone Synthetic Rubber and Latex Co., Akron, Ohio.

Peter J. Marcello, vice-president of Acme-Hamilton Manufacturing Corp., will direct operations of the Swainsboro, Ga., plant of the recently-acquired New York Rubber Corp. from the Trenton, N. J., headquarters of the company.

Walter C. Archinal, previously with Rubber Corp. of America, has been named superintendent of coatings production for Metal and Thermit Corp. at Carrollton, Ky.

Dr. Thomas Gillespie, a physical chemist at the Physical Research Laboratory of the Dow Chemical Co. in Midland, Mich., has been promoted to the rank of associate scientist in recognition of his accomplishments in latex rheology research.

Stewart F. Oakes, formerly assistant to the president of Hobbs Manufacturing Co., Worcester, Mass., has been elected president of the company, succeeding **Willard H. Ware,** who was made chairman of the board while retaining his post as treasurer.

An index to Volume 88 of RUBBER AGE will be found on pages 177 to 180 of this issue.

R. H. Kellar

Named by Goodrich

► Robert H. Kellar has been appointed technical manager of processing for the B. F. Goodrich Industrial Products Co. at Akron, Ohio. Mr. Kellar graduated from the University of Minnesota in 1939 with a B.A. degree in chemical engineering, and received his M.S. degree in chemical engineering there in 1941. He joined Goodrich in 1944 on the technical staff of the Processing Division. Two years later he was assigned to development compounding for B. F. Goodrich Aviation Products. He was transferred in 1957 to that division's Los Angeles facility as section manager for fuel cell compounding, development, and testing.

James M. Rice, consultant to the Natural Rubber Bureau, Washington, D. C., has been elected president of the Association of Asphalt Paving Technologists.

Richard J. Wilson has been appointed sales representative for American Mineral Spirits Co., Chicago, Ill., and will represent the firm in the sales of aliphatic and aromatic naphthas and waxes in Illinois, Indiana, Iowa and Wisconsin.

J. A. Moffitt, Jr., has been appointed marketing manager for the Connecticut Hard Rubber Co., New Haven, Conn. **A. J. DeFrancesco** has been named sales manager.

Douglas M. Smith, formerly Eastern regional sales manager of the Mechanical Goods Division of U. S. Rubber Co., New York, N. Y., has been appointed marketing manager of the division.

Healy Addresses Rubber Salesmen

► Dick Healy, economist for the J. M. Huber Corp., gave his views on the general economy and the rubber industry for the remainder of 1961 and for 1962, at a meeting of the Akron Rubber Chemical Salesmen's Association, held on February 24, 1961, in Akron, Ohio.

Regarding the rubber industry, Mr. Healy expressed the opinion that 1961 won't be too bad. He predicted that rubber consumption will be down about 4.7 per cent from 1960, returning near the 1960 level in 1962.

According to the speaker, passenger tire production in 1961 will be down about 7 per cent, original equipment tires down 13 per cent, and replacement tires down 5 per cent from the 1960 figures. He stated that truck and bus tire production will be about the same. Mr. Healy predicted that 1962 should be a good replacement tire year, with an increase of 11 to 12 per cent over 1961.

Replacement Tire Sales

Mr. Healy noted that most rubber companies predict passenger replacement sales at 70 to 73 million units in 1961. He predicted a figure closer to 65.6 million units, based on the fact that for the first time in 10 years the number of tires two years of age and older dropped at the end of 1960. He explained that normally about 60 per cent of these tires are replaced and, based on this drop, replacement sales will drop.

The Huber economist informed the group that up until the 1961 forecast, those market analysts using the age of tires as an indicator of replacement sales, and those using other indicators, have agreed on their forecasts. Mr. Healy stated that this will not be so for 1961, and it will be interesting to see which indicators are correct this year.

General Outlook

Mr. Healy stated that over-all industrial production is presently down 10 to 12 per cent from June, 1960, and unemployment will approach 6 million before getting better. In addition, home building is off 18 to 20 per cent from June, 1960, auto production is off 25 to 40 per cent, and capital spending is off 5 per cent.

According to the speaker, there should be a firm upturn in home building shortly with Government help, steel inventories will have to be refilled to some extent, and increased employment benefits will be available. However, he pointed out, this upturn will not be strong. There still will be a major weakness. Business spending will still be down and domestic auto production will wind up around the 5.8 million mark, down from 1960. All in all, he felt, we will have to wait until the end of 1961 for a rapid recovery rate.

Mr. Healy expressed the feeling that 1962 will be a good year—resembling 1959, with some new records being established. He predicted that domestic auto production will be 6.8 to 6.9 million cars, home building will set a new record with 1.5 million starts, and capital spending will increase.

January Meeting

The Rubber Chemicals Salesmen's Association of Akron held its first meeting for 1961 on January 27 at Nick Yanko's in Akron, Ohio. The speaker at the meeting was Sam Morgan (Goodrich-Gulf), who discussed "Sales Management." Mr. Morgan related his past experiences with the sales of GR-S for the Federal Government, from the inception of GR-S through the final sales of the government rubber plants to private enterprise. He also touched on the subject of selling today, in which he stressed that personal interest is the most important attribute of a salesman.

E. F. Coakley

J. W. Houtz

G-E Names Representatives

► Edward F. Coakley and J. William Houtz have been named sales representatives for the Silicone Products Department of General Electric Co., Waterford, N. Y. Mr. Coakley will cover the New England district and will be located at Boston, Mass. Mr. Houtz has been assigned to the East Central district, and will be headquartered at Cleveland, Ohio.

A native of Boston, and a graduate of the Boston Latin School, Mr. Coakley received his B.S. degree in chemistry from Boston College in 1957. He was associated with the B. F. Goodrich Co. for three years before joining the Silicone Products Department in 1960. He is a member of the Boston Rubber Group.

Mr. Houtz was born in Oil City, Penna., and graduated from Pennsylvania State University in 1954 with a B.S. degree in chemistry. He was associated with Pillsbury Mills as a chemist from 1957 to 1958, and has worked as a chemist with Wolf's Head Oil Refinery, Inc. since 1958. He joined General Electric in 1960 as a sales trainee for the Silicone Products Department.

Financial News

Seiberling Rubber

► Year ended December 31: Net income amounted to $130,986 as compared with $1,191,019 reported for the previous year. Net sales were $48,025,683 and $54,787,924, respectively. It was pointed out that income from plastics, foreign business and other diversified lines in 1960 was sufficient to overcome the sharp loss experienced by the tire division.

Mohawk Rubber

► Year ended December 31: Net sales rose to $32,326,000, as against $31,656,000 in 1959, while net income dipped to $1,068,000 for 1960, as compared with $1,219,000 the year before. Earnings per share were $2.07, down from $2.36 a share in 1959.

Electric Autolite

► Year ended December 31: Net income was $5,573,573, compared with $10,743,697 in 1959, with earnings per share at $3.76, as against $6.15 in the previous year. Net sales rose to $221,819,216, compared with $220,772,395 in 1959.

Electric Storage Battery

► Year ended December 31: Net income dropped slightly to $6,040,000, equal to $3.58 per share, compared with $6,108,000, or $3.62 per share in 1959. Net sales were up $148,124,000, as against $144,578,000 in the previous year.

Pierce & Stevens

► Year ended December 31: Net income amounted to $615,584 on sales totaling $8,314,067, compared with a net income for 1959 of $620,851, on sales of $8,100,036. Earnings per share came to 95c, the same as for the previous year.

Clevite

► Year ended December 31: Earnings amounted to $6,825,635, or $3.53 per share, compared with $6,493,961, or $3.53 for the previous year. Sales and other revenues rose to a new high of $95,525,348, as against $86,182,586 for 1959.

St. Joseph Lead

► Three months ended December 31: Net income was reported at $879,548, as against $1,692,965 for the same period in 1959, with earnings per share at 32c, down from 62c the previous year. Net sales were $17,421,518 as against the $21,234,625 reported for the comparable period in 1959.

Firestone

► Three months ended January 31: Earnings for the first quarter of the fiscal year were $13,603,958, or 50c a share, as against $13,564,023, also 50c a share, for the same period in 1960. Net sales amounted to $267,974,146, compared to $273,000,000 for the same period last year.

American Biltrite

► Year ended December 31: Net income for 1960 amounted to $1,545,099, on sales of $67,804,569. In 1959, net income was $3,016,925, on sales totaling $70,393,714. Earnings per share for 1960 came to $1.01, as against $2.09 for the previous year.

Industrial Rayon

► Year ended December 31: A net loss of $3,341,000 in 1960 was reported on sales totaling $47,391,000. In 1959, net income was $839,000, while sales were $62,068,000. On a per share basis, net loss in 1960 was $1.80, compared with a net income in 1959 of 45c.

Farrel-Birmingham

► Year ended December 31: Net income was $1,752,916, or $5.48 per share, compared with $1,338,893 in 1959, the equivalent of $4.18 per share. Net sales of $41,779,430 showed an 11 per cent increase over the $37,592,767 reported in 1959.

DuPont

► Year ended December 31: Net income amounted to $381,000,000, or $8.10 a share, compared with $418,695,610, or $8.92 per share for 1959. Sales reached a record of $2,143,000,000, as against $2,114,322,970 for the previous year.

Goodrich 1960 Sales Are Second Highest

► Net sales of the B. F. Goodrich Co. in 1960 amounted to $764,736,162, second only to the record figure of $771,591,342 in 1959. Net income for 1960 was $30,020,565, equal to $3.33 per share, compared with $37,580,186, or $4.18 per share in the 1959 calendar year.

J. W. Keener, president, in issuing the annual report noted that earnings of Goodrich, and for the rubber industry as a whole, were reduced in 1960 by higher prices for natural rubber and a rise in employment costs. He added that of even greater impact on 1960 earnings was the effect of severe price competition which brought replacement tire prices to the lowest relative levels since World War II. Also, prices of polyvinyl chloride general-purpose resins, of which Goodrich is a major producer, were reduced by more than 20 per cent.

In 1960, the capital expenditures and investments of Goodrich and its consolidated subsidiaries totaled $41,377,375, compared with the 1959 figure of $34,274,820, and second only to the 1954 expenditures of $44,857,321. To finance its program of capital and investment expenditures, and to increase working capital, the company, in November, 1960, borrowed $60 million through the sale of 4⅝ per cent sinking fund debentures, due November 15, 1985.

In its 1960 capital expansions, Goodrich began construction in June of a tire manufacturing plant at Fort Wayne, Ind., to produce passenger, truck, and farm tires. The plant is scheduled to go on stream in September, 1961. In July, production began at its Long Beach, Calif., polyvinyl chloride plant. B. F. Goodrich Canada, Limited, is building a new tire manufacturing plant near Kitchener, Ontario, which is expected to be on stream by mid-1962. Tire manufacturing subsidiaries in Brazil and Australia began operations early in 1960, and a new tire manufacturing subsidiary in Iran is scheduled to commence operations early this year.

Plymouth Rubber

► Year ended November 26: Net sales were $23,160,278 for the fiscal year, slightly lower than the $23,845,730 reported for 1959. Net income totaled $771,367, or 94c a share, compared with $1,246,959, or $1.52 a share, for the previous year.

Heads New Tire Unit

► G. A. Spaulding, formerly plant manager at the Miami, Okla., facilities of the B. F. Goodrich Co. has been named plant manager of the company's new tire unit now under construction in Fort Wayne, Ind. The new facility is scheduled to start production by the end of this year. Mr. Spaulding joined Goodrich in 1936 as a tire builder. After receiving his B.A. degree from Ohio University, he rejoined the firm as a time-study man in Akron. He served as a Navy lieutenant during World War II, and then returned to the Akron tire plant as an industrial engineer. He became, successively, manager of time-study and methods at Tuscaloosa, Ala., production superintendent at Miami, Okla., production superintendent at Oaks, Penna., and plant manager at Miami, Okla.

New Parke-Davis Plant

► Parke, Davis & Co. plans to construct a $4 million surgical dressing plant at Greenwood, S. C., and close its two plants at Bridgeport and Versailles, Conn. The new plant is expected to be completed by the end of 1961.

Named by Witco

► Witco Chemical Co., Inc. has promoted Herbert Schoenfield from product sales manager to assistant manager of its Urethane Chemicals Department. Mr. Schoenfield will have responsibilities for research and development activities, technical services, and sales. He will continue to be headquartered at the firm's Chicago, Ill., sales offices. Mr. Schoenfield holds a B.S. degree in chemistry from the Illinois Institute of Technology and a M.S. degree from the University of Chicago. He is a member of the ACS Rubber Division, and is also a member of the Akron, Chicago, Fort Wayne, and Southern Rubber Groups.

Gates Belgium Plant

► Construction of a $4 million facility at Erembodegem, Belgium, has been started by the Gates Rubber Co., Denver, Colo. The plant, expected to be completed by the end of 1961, will produce belts and hose for sale initially in European Common Market countries. The company reports that it will later market the new unit's products to other European countries as well as abroad.

Buffalo Hears Alliger

► "Stereo Polymers" was the subject of a talk presented by Dr. Glen Alliger, assistant director of research of the Firestone Tire & Rubber Co., on March 7, 1961, at the Spring Meeting of the Buffalo Rubber Group at the Hotel Westbrook in Buffalo, N. Y. Dr. Alliger described various stereo regular polymers and emphasized the importance of a polymer having a regular structure in order to obtain the desirable properties of natural rubber.

Of particular interest to the group was Dr. Alliger's discussion of a polybutadiene made with an alkyl lithium catalyst, which has an amorphous structure with a narrow molecular weight distribution. According to the speaker, these features give predominantly excellent resilience and low heat build-up in tires.

Goodyear Plant Expansion

► Goodyear Tire & Rubber Co. is planning a $2 million, five-year program to expand and improve its Industrial Products Division at Lincoln, Nebr. The company has already begun construction of a $400,000 addition to the plant to alleviate a lack of manufacturing space.

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West Coast News

► The Los Angeles Rubber Group, Inc., held a dinner and technical meeting on March 7 at the Biltmore Hotel in Los Angeles, Calif. The dinner was attended by 291 members and guests, with 80 members in attendance at the technical session. A highlight of the dinner meeting was the presentation of an Honorary Life Membership Certificate to Leonard K. Firestone, president of the Firestone Tire and Rubber Company of California. Past TLARGI president Charles H. Kuhn (Master Processing) presented the certificate in recognition of Mr. Firestone's outstanding and unselfish services to the organization, to its educational foundation at the University of Southern California, and to the rubber industry of the area.

At the technical meeting, a paper on "Shell Butadiene Rubber" was presented by Mr. A. V. Snider, product development manager for the Synthetic Rubber Division of Shell Chemical Co., Torrance, Calif. Mr. Snider explained that Shell butadiene rubber is a highly linear *cis*-1,4 polybutadiene with exceptional structural purity and ability to crystallize. This new elastomer provides an attractive balance of desirable vulcanizate properties for tires and mechanical goods, Mr. Snider declared, and age resistance and thermal stability are comparable to butadiene-styrene rubber. Its resilience is slightly better than natural rubber, while its abrasion resistance and low temperature flexibility are superior to both natural and butadiene-styrene rubbers.

In addition, the speaker continued, the resilience of Shell butadiene rubber is less adversely affected by reinforced fillers, so that somewhat higher than normal filler loadings may be tolerated. Consequently, he pointed out, this offers much greater latitude in compounding to optimize cost and/or performance. The polymer is compatible in all proportions with natural rubber, butadiene-styrene rubber, and other general-purpose diolefin polymers.

The speaker went on to say that processability considerations require that Shell butadiene rubber be blended with about 25 per cent of natural rubber for trouble-free factory operations. The advantages of the product, however, are retained to a substantial degree in blends, he maintained, and are complemented by the beneficial processability, tack, and strength properties of natural rubber.

Mr. Snider concluded by saying that although this polymer is regarded primarily as a potential replacement for natural rubber in tires —particularly in treads, because of its greater resilience, aging resistance, abrasion resistance, and low temperature flexibility — it is anticipated that uses will develop for the material in other applications where these properties are of importance.

Leonard K. Firestone (Firestone), left, receives his TLARGI Honorary Life Membership Certificate from Charles H. Kuhn (Master Processing).

► Thomas H. Gribben has been promoted to manager of tread rubber sales for the Pacific region of the B. F. Goodrich Tire Co. He will coordinate tread rubber sales and production, and will give technical assistance to customers engaged in tire retreading in the company's San Francisco, Calif.; Denver, Colo.; Salt Lake City, Utah; and Los Angeles, Calif., sales zones.

► Hays B. Robinson has been named manager of the Extrusion Department of Accurate Products Co., Pacific Beach, Calif. The company has also announced the promotion of Jack M. Innis from sales representative to general sales manager.

► Lee-Tex Rubber Products Corp., Gardena, Calif., is moving its operation to Oxnard, Calif.

Exchanging Know-How

► A technical know-how exchange on the subjects of *cis*-polyisoprene and *cis*-polybutadiene has been arranged between Goodrich-Gulf Chemicals, Inc., Cleveland, Ohio, and the Chemische Werke Huels, Marl, West Germany. The two companies will exchange information and data which include laboratory and pilot plant data, process design data, plant design data, and manufacturing know-how, useful in the design and operation of a plant for the production of the stereo-specific rubbers. The West German company now holds a license under Goodrich-Gulf's West German patent rights for the stereo-specific rubbers. In addition, it is licensed under Prof. Karl Ziegler's patents.

Thiokol Opens Pilot Plant

► Limited operations have begun at the new polymer facility of the Thiokol Chemical Corp. at Moss Point, Miss. Essentially a pilot-plant operation, the unit is designed to produce polymers which will complement the company's existing product line, which includes polysulfide rubber, polysulfide liquid polymer, and rubber chemicals. Thiokol expects to expand beyond this minimum-sized unit once the marketability of its new polymer products has been established.

New Royal RM Sulfurs

► H. M. Royal, Inc., Trenton, N. J., has developed a new line of RM sulfurs said to have a 99.9 per cent purity. Purity of the new sulfur is guaranteed at 99.9 per cent by Royal as a result of the extremely high quality crude sulfur used in its production. In addition, the product is said to offer extremely low ash, carbonaceous matter, moisture, and acidity content.

U.S. Rubber Tire Prices

► An increase of 5 per cent on its first line passenger tires and 2.5 per cent on its highway-type truck tires has been made by the U. S. Rubber Co. The increases, which became effective on April 1, apply to U. S. Royal rayon and nylon tires, both tubed and tubeless. Also included are the company's mud and snow tire and its all-butyl passenger tire. Prices of tubes remain unchanged.

Labeling Act Available

► The Rubber Manufacturers Association has issued copies of Public Law 86-613, entitled "Federal Hazardous Substances Labeling Act," which became effective on July 12, 1960. The RMA reports that this act, which repeals part of the former Federal Caustic Poison Act, requires that for the protection of the public health and safety the immediate containers of "hazardous substances," as defined by the act, must be conspicuously labeled, in conformance with the act. The RMA recommends to rubber manufacturers examination of their products, especially those which might find their way into household use, so as to determine whether the containers must be labeled in accordance with the new act, or whether existing labels must be changed to bring them into conformity.

Mobay Promotes Heiss

► Mobay Chemical Co., Pittsburgh, Penna., has promoted H. L. Heiss to the position of research specialist. In his new assignment, Mr. Heiss will have the prerogative of working independently on research projects. A graduate of Lawrence College with a B.A. degree in chemistry, Mr. Heiss joined Mobay in 1954. He recently was honored as Mobay's "Research Man of the Year" for his exploratory work in urethane chemistry. Mr. Heiss is the author of the article "Low Durometer Cast Urethane Elastomers," which appeared in the October, 1960, issue of RUBBER AGE.

► International Latex Corp., Dover, Del., has appointed the Paul Wiemer Co., Cincinnati, Ohio, as its representative for the southern Ohio area.

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Left to right, Frank B. Smith (Naugatuck Chemical), chairman of the Connecticut Rubber Group, speaks to E. L. Borg (Naugatuck Chemical), who presented a paper at the February 17 meeting of the Connecticut Rubber Group.

Connecticut Group Hears Borg

► E. L. Borg, group manager for synthetic rubber and latex research and development of the Naugatuck Chemical Division, U. S. Rubber Co., presented a paper entitled "High Solids SBR Latex by a Chemical Promoted Agglomeration" on February 17, 1961, before 176 members of the Connecticut Rubber Group at Rapp's Paradise Inn in Ansonia, Conn. Mr. Borg co-authored the paper with L. H. Howland, E. J. Aleska, and R. W. Brown, all with Naugatuck Chemical.

The speaker explained that for many applications, particularly in the manufacture of foam sponge, a high solids, large particle synthetic rubber latex is required. The polymerization of such a latex is slow and costly, he stated, and, in contrast, the polymerization of the small particle rubber latices is rapid.

According to Mr. Borg, the small particles in a latex taken from a rapid polymerization can be agglomerated to the large size required in high solids application, and certain high molecular weight chemicals will promote latex particle agglomeration. Polyvinyl methyl ether is particularly effective, he remarked, and its utility is enhanced by a close control of its molecular weight and structure.

Mr. Borg informed the group that a practical application of polyvinyl methyl ether to the post-polymerization agglomeration of a small particle SBR latex has been made, and a commercial large particle, high solids latex is produced in this way. This latex, he explained, is particularly useful in the manufacture of foam sponge and for other applications where its features of large particle size, high solids, and low viscosity are desirable properties.

U. S. Rubber Patent

► After eight years of consideration by the Patent Office, the U. S. Rubber Co. has been granted U. S. Pat. No. 2,974,373 on waterproof footwear with a cellular plastic inner layer, said to add warmth without weight or bulk. The patent covers the method of making, as well as the product. The new footwear will be marketed under the brand name Insulair. The company states that the patent covers not only the waterproof footwear item, but also other plastic products having insulating cellular linings. It is one of a group of patents applied for by the company as a result of its work in casting vinyl dispersions. U. S. Rubber expects to grant manufacturing licenses under its patent to other manufacturers of waterproof footwear.

Canadian News

► A full scale commercial plant for the manufacture of polybutadiene rubber will be built in Sarnia, Ontario, by the Polymer Corp., Ltd. It is expected that construction will begin in the summer of 1961 and that the unit will go on stream before the end of 1962. According to the company, the plant, with an estimated annual capacity of 20,000 tons, can be adapted to produce polyisoprene.

A solution polymer pilot plant has been in operation in Sarnia since 1958, and has produced a variety of stereo-specific polymers. In 1960, the capacity of the pilot plant for producing polybutadiene was increased to several tons per month, and this facility will continue to supply evaluation quantities until the commercial plant is in operation.

The process at the new unit will be carried out under licenses from Prof. Karl Ziegler and from Goodrich-Gulf Chemicals, Inc.

The company reports that the project is part of an expansion program announced last fall, including, in addition to the polybutadiene unit, facilities for specialty rubbers and black masterbatches.

► An International Symposium on Macromolecular Chemistry will be held on July 27 to August 1, 1961, at the Queen Elizabeth Hotel in Montreal. The symposium is cosponsored by the Division of Polymer Chemistry of the American Chemical Society and the Commission on Macromolecules of the International Union of Pure and Applied Chemistry. Only one plenary lecture has been planned, and this will be a discussion of the most recent trends in polymer chemistry by Prof. Herman F. Mark of the Polytechnic Institute of Brooklyn. The provisional program has been divided into five main sections: high polymers in solution; properties of solid polymers; polymerization; reactions of high polymers, and natural colloids.

► DuPont of Canada reports that its sales in 1960 reached $99,812,000, a 10 per cent rise from the 1959 figure of $90,921,000. Net income for 1960 was $6,835,000, equal to earnings of 92c per share of common stock, compared with $7,169,000, or 97c per share for the previous year.

Mast Expanding Line

► Mast Development Co., Davenport, Iowa, has made an investment agreement whereby the Midwest Technical Development Corp., a Minneapolis, Minn., investment firm, will provide $350,000 of new capital for expansion activities by Mast. According to the company, the investment will make possible the manufacture of a line of technical products to be supplied to industry and government. Mast reports that several of these new items, including automatic recorders for ozone and olefins, are almost ready to be marketed.

With the financing arrangement, John B. Hawthorne, vice-president of Midwest Technical, becomes a director of Mast Development. As part of the financing agreement and over-all expansion program, Midwest Technical has endorsed a plan permitting stock purchases and stock options for key technical personnel.

Pelmor Develops Latices

► A variety of non-flammable Viton latex compositions known as Peltex, said to have a variety of end-use applications, is available from Pelmor Laboratories, Inc., Newtown, Penna. The new latices use the standard techniques required for other types of rubber latex. The company states that Peltex offers high temperature and oil resistance, permitting thin films, coatings, impregnations, and linings.

Joins Goodyear Rubber

► Emmett F. Williams, formerly plant manager of the John R. Evans Co., has joined the Goodyear Rubber Co., Middletown, Conn., as vice-president and general manager. Mr. Williams attended the Rhode Island School of Design and Bryant College, and has a broad background in manufacturing in the textile and plastics industries.

Andreoli Gives Up Post

► Joseph A. Andreoli has relinquished his duties as executive vice-president of the General Tire & Rubber Export Co., Akron, Ohio, but will remain with the company as an advisor on foreign business. In this capacity, he will continue to work with the export company as well as with the firm's overseas plants. Mr. Andreoli began his career in the rubber industry as an employee in the curing room at B. F. Goodrich Co. In 1918, he joined Goodyear Tire & Rubber Co., and seven years later the former India Tire & Rubber Co. in Mogadore, Ohio, and set up its export department. He has been affiliated with General Tire since 1930.

Huber Names Courtney

► J. M. Huber Corp., New York, N. Y., has named Philip L. Courtney vice-president of its Clay Division, succeeding Wilbur J. Driver, who has retired. Mr. Courtney will be responsible for the activities of the division, which mines and processes kaolin clays in Georgia and South Carolina for use by the rubber and other industries. Headquarters of the Clay Division, previously located in Langley, S. C., have been moved to Huber, Georgia. In other appointments, Charles H. Marvin, formerly manager of the South Carolina operations, has been named assistant vice-president of the division, and Frank M. Gribble becomes general manager of the Georgia operations.

MacAlonan Elected

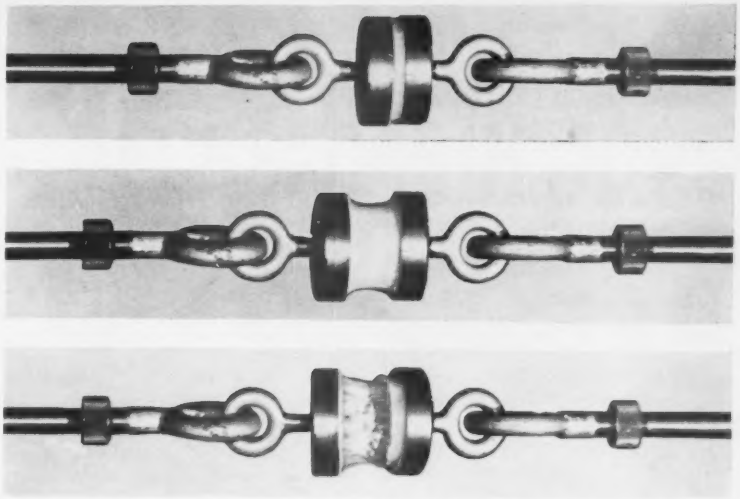
► A. W. MacAlonan has been elected president of the Stalwart Rubber Co., Bedford, Ohio, succeeding the late H. W. Osborn. The board of directors have also elected the following officers: Edwin H. Osborn, executive vice-president; Frank K. Byers, Jr., vice-president; John J. Kravetz, assistant vice-president and director of research and development; Richard R. Long, assistant vice-president and director of the Silicone Division; Albert V. Volpe, assistant vice-president and director of production; and William P. Lindauer, secretary.

► George Woloch Co., scrap rubber dealers of New York, N. Y., has purchased a 100,000 square foot plant in Newark, N. J., through its subsidiary, Sylvan Products, Inc.

G-E Self-Bonding Silicone Rubber

► A new family of self-bonding silicone rubber compounds and reinforced gums that afford a primerless bond to ferrous-containing metals said to be stronger than the highest strength silicone rubber, has been developed by the Silicone Products Department of the General Electric Co., Waterford, N. Y. Designated SE-5504U, the initially-available grade is a high strength, extreme low temperature compound, said to be similar to G-E's standard SE-555 silicone rubber. The company expects that the new material will be of use to mechanical rubber fabricators in broad line processing and to specialty manufacturers for shock mounts, rubber rolls, oil seals, and a variety of other products where high strength, trouble-free bonds are desired.

SE-5504U, a gray compound, has such typical properties after cure of 25 hours at 350°F. as: tensile strength of 1500 psi; tear of 200 psi; elongation of 550 per cent; Shore A hardness of 50, and a compression set of 45 per cent after 22 hours at 300°F.



Direct pulling tests of G-E's new self-bonding silicone rubber, SE-5504U, failed to destroy the bond at stresses exceeding the strength of the rubber itself. The photographs, from top to bottom, show the silicone rubber bond at three points of increasing stress. When the rubber had stretched to about five times its original size (bottom) it slowly ruptured but the bond remained intact.

G-E reports that excellent bonds have already been established to steel, chrome steel, and stainless steel, and that other metals are presently being investigated. The company points out that unlike techniques using a primer, where the primer achieves the chemical interaction between the rubber and the surface to which it is to be bonded, SE-5504U establishes a bond through a direct reaction with the metal.

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Obituaries

Everett H. Johnson

► Everett H. Johnson, retired vice-president of the Wellington Sears Co., New York, N. Y., died on February 21 in his home at Winter Haven, Florida. He was 60 years old. Mr. Johnson joined the Boston office of Wellington Sears in 1917 as an office boy. Later he became associated with the Sales Division, and was senior vice-president of sales at the time of his retirement in 1958. Mr. Johnson represented the cotton duck industry in dealing with the Office of Price Administration during World War II. He also served for many years on the General Arbitration Council of the textile industry. His survivors are his wife, a son, and a daughter.

Norman Leeds, Jr.

► Norman Leeds, Jr., assistant general manager of the Raybestos Division of Raybestos-Manhattan, Inc., Stratford, Conn., died on March 12 at the age of 59. A native of Stamford, Conn., Mr. Leeds graduated from Yale University in 1923 with a B.S. Degree in Engineering. He joined the company's Raybestos Division in 1926, and served successively as process engineer, service engineer, assistant sales manager, sales manager, and factory manager. He was elected to the board of directors of the parent company in 1955, and since 1956 had served as assistant general manager of the Raybestos Division. Mr. Leeds' survivors are his wife and daughter.

Albert M. Hagen

► Albert M. Hagen, production manager of the General Cable Corp., Perth Amboy, N. J., died on March 18 of a heart attack at his home in Metuchen. He was 67 years old. A native of Pittsburgh, Penna., Mr. Hagen received a mechanical engineering degree from Cornell University. After his graduation in 1917, he joined General Cable in Perth Amboy. He served as plant manager at the New Jersey, the St. Louis, Mo., and the Los Angeles, Calif., units, before his appointment in 1950 as production manager. Mr. Hagen leaves a widow.

Harry L. Fisher

► Dr. Harry Linn Fisher, noted scientist and educator, international authority on natural and synthetic rubbers and the 1949 recipient of the Charles Goodyear Medal, died suddenly at his home in Claremont, Calif., on March 19. He was 76 years old.

Dr. Fisher was the author of more than 50 professional articles and patents on the attachment of rubber to

metal and sulfurless vulcanization of rubber. He prepared many revisions of his famed 1920 "Laboratory Manual of Organic Chemistry" and was the author of such books as "Rubber and Its Use," and "The Chemistry of Natural and Synthetic Rubbers." He long predicted that automobile tires eventually would be made to last 100,000 miles, or the lifetime of an ordinary car, and come in colors to match the cars. He also foresaw highways made of rubber.

Dr. Fisher graduated from Williams College in 1909, received an M.A. degree in organic chemistry a year later at Columbia University, and in 1912, after teaching at Cornell University's Medical College, received a Ph.D. degree from Columbia. Williams College conferred an honorary Doctor of Science degree on him in 1953. He became a research chemist for the B. F. Goodrich Co. in 1919, after teaching at Columbia for seven years. In 1926 he joined the United States Rubber Co. as a research chemist. In the ten years he spent with U. S. Rubber, he made discoveries that helped clear up some of the mysteries of rubber vulcanization. He left U. S. Rubber in 1936 to become director of organic chemical research for the Air Reduction Co. and later for U. S. Industrial Chemicals, Inc. During World War II, he served in the Polymer Research Branch of the Office of Synthetic Rubber in Washington, D. C. He later became a special assistant to the director.

From 1953 to 1957, Dr. Fisher was professor of rubber technology at the University of Southern California School of Engineering and the first director of the TLARGI Rubber Technology Foundation established by the Los Angeles Rubber Group for teaching and research. He was president of the American Society in 1954 and a past-president of the American Institute of Chemists.

Dr. Fisher won the Modern Pioneer award from the National Association of Manufacturers in 1940 for developing a method of attaching rubber to metal, and the Chandler medal from his alma mater, Columbia University, in 1954, for outstanding contributions to the chemistry of synthetic rubber. He leaves a widow, two daughters, and a son.

James S. Boyle

► James S. Boyle, plant superintendent and chief chemist of the New Jersey Wood Finishing Co., Woodbridge, N. J., died on March 24 at his home in Woodbridge. He was 64 years old. Mr. Boyle, a graduate of St. Peter's College, had been with New Jersey Wood since 1940. Prior to joining the company, he was associated with the General Cable Corp. and the Anaconda Wire & Cable Corp. Mr. Boyle was a charter member of the American Chemical Society and of the New York Rubber Group. He also was a Fellow of the American Institute of Chemists and a member of the American Society for Testing Materials. Mr. Boyle leaves a widow and two daughters.

Charles A. Hemingway

► Charles A. Hemingway, former president of Westwood Chemical Co., Cleveland, Ohio, died on January 23. Prior to joining Westwood Chemical, he was associated with the Firestone Tire & Rubber Co. He had served the rubber industry for over 30 years at the time of his death. Mr. Hemingway leaves a wife and a son.

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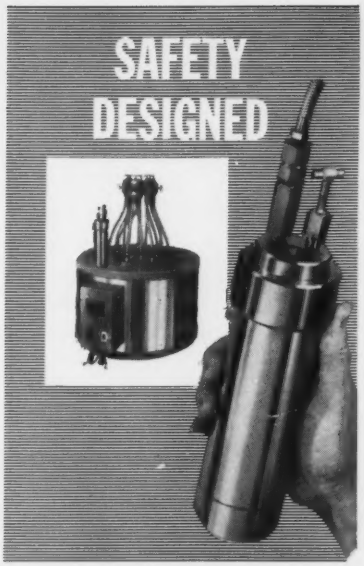

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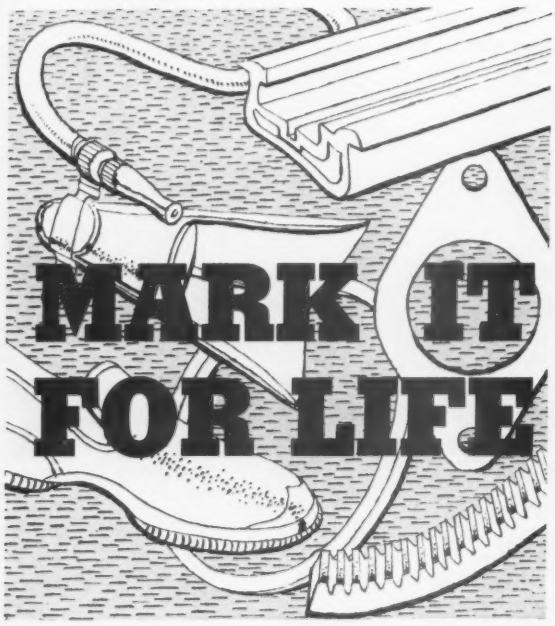

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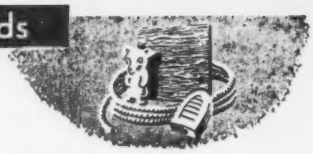

Goodyear Golf Car Tire

► A tire 16 inches high with a tread 15 inches wide, designed for use on golf cars, has been developed by the Aviation Products Division of the Goodyear Tire & Rubber Co., Akron, Ohio. According to the manufacturer, the new tire, called Terra-Tires, combines the high sidewall

deflection principle of airplane tires with extreme flexibility, large air volume at low pressure, and broad ground contact area. The result, the manufacturer states, is an axle-loaded, axle-driven tire that can operate at air inflation pressure as low as one pound per square inch, compared with five pounds of pressure in present golf car tires. The company adds that Terra-Tires have demonstrated in tests that they can reduce the power consumption in battery-operated golf cars as much as 50 per cent.

U.S. Rubber Rafts

► Ten and fifteen-passenger inflatable life rafts have been developed by the U.S. Rubber Co., 1230 Avenue of the Americas, New York 20, N. Y. One of the chief features of the raft is a boarding platform, which is said to make it simpler for passengers to climb aboard. In its manufacture, the raft is vulcanized, which adds substantially to its storage and service life. In addition, vulcanization is said to result in stronger seams. The raft, along with its boarding platform, inflates in less than 30 seconds with the tug of a single lanyard. Double air chambers in the bottom assure flotation in the event of any damage. The raft comes packed in a case made of expanded Royalite.

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Pioneer Industrial Glove

► A new Pylox-coated, jersey-lined work glove has been added to the Stanflex line of industrial gloves manufactured by the Pioneer Rubber Co., Willard, Ohio. The 10-inch liquid-tight gauntlet, designated No. 510, is designed with a single seam, one-piece hand and gauntlet construction to provide a custom-tailored fit. The curved fingers and unusual thumb design are said to

adjust comfortably to the contours of the hand. One of the features of the No. 510 is its outer covering of Pylox, a vinyl compound developed by the manufacturer. This material is said to resist abrasion, snagging, tearing, and is puncture-proof. In addition, it will not deteriorate upon contact with oils, acids, caustics or other harsh substances, the company points out. The Pylox material, according to Pioneer, enables the work gloves to stay flexible under the most extreme conditions. Even when used in cold temperatures, they stay soft, never hindering hand and finger movement. The jersey lining insulates the hands against extreme temperatures and absorbs perspiration.

Ribbed Conveyor Belt

► A conveyor belt with molded diagonal cleats on its top, called the Cleat Top Belt, has been developed by Hewitt-Robins Inc., Stamford, Conn. Designed to carry wet sand, gravel, dry grain and other materials up steep slopes, it can reportedly rise as steeply as 21 degrees without the slip-back encountered with smooth-cover belts. When the belt is operated with the diagonal ribs pointing in the direction of belt travel, moisture in the load is retained uniformly throughout the length of the belt. If the belt is run with the open ends of the diagonal ridge trailing the direction of travel, water is drained off the material being transported. The belt is currently available in widths ranging from 12 to 30 inches, and will be available in greater widths in the future.

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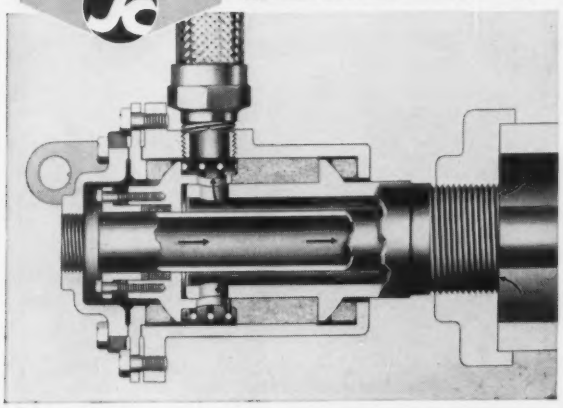

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The only explanation I have is that he must be in the neoprene business— and knows that MAGLITE is the key to superior scorch protection.

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The performance-proved magnesium oxide

Want to eliminate scorch damage in neoprene processing? Specify MAGLITE D. Tests prove that it offers better scorch protection for neoprene than any other magnesium oxide you can use. MAGLITE D also helps solve storage problems since it occupies about one-third the warehouse space as many of the lightweight magnesias. The benefits of using MAGLITE K, M, or Y for other elastomers and certain product or process requirements are equally impressive. For samples and technical information write to MERCK & CO., INC., Marine Magnesium Division, Department RA-2, Rahway, New Jersey.

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BALE CUTTERS

★ Automatic ★ Bench Type ★ Standard

A Model For Every Requirement

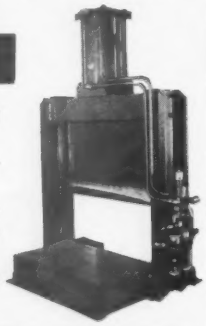
Cut Bales of Crude, Synthetic, Reclaimed Rubber . . . Plastics and Resins.

NEW

FULLY AUTOMATIC 29"

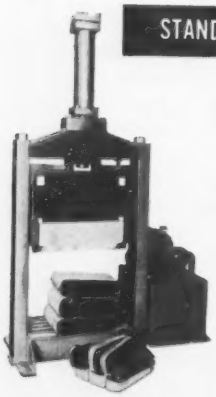
Automatically feeds, measures and cuts bales. Discharges cut pieces to take-away conveyor or tote box. Slice thickness adjustable from 2" to 6". Knife cuts on continuous time cycle or can be manually operated if desired. A fully self-contained unit. Knife 29" — stroke 23".

SMALL BENCH TYPE 24"



For laboratory use or compounding at Banbury.
Cuts full size synthetic Bales or Pre-cut Crude Rubber.
Air operated cushion action knife actuated by dual electric safety controls.
Easily mounted on Bench or Table — Knife 24" — stroke 12".

STANDARD 29" & NEW 50" MODELS



Cuts without lubricant.
Bales are advanced on rollers and can be cut into 1" minimum slices.
Cutters are manually operated and safety control valve requires operator to stand clear while knife is in motion.
Knife 29" — stroke 23" or knife 50" — stroke 36".

Write for details today — Your inquiries will have our prompt attention.

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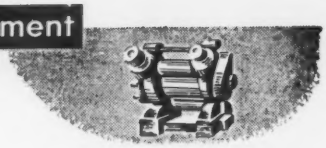


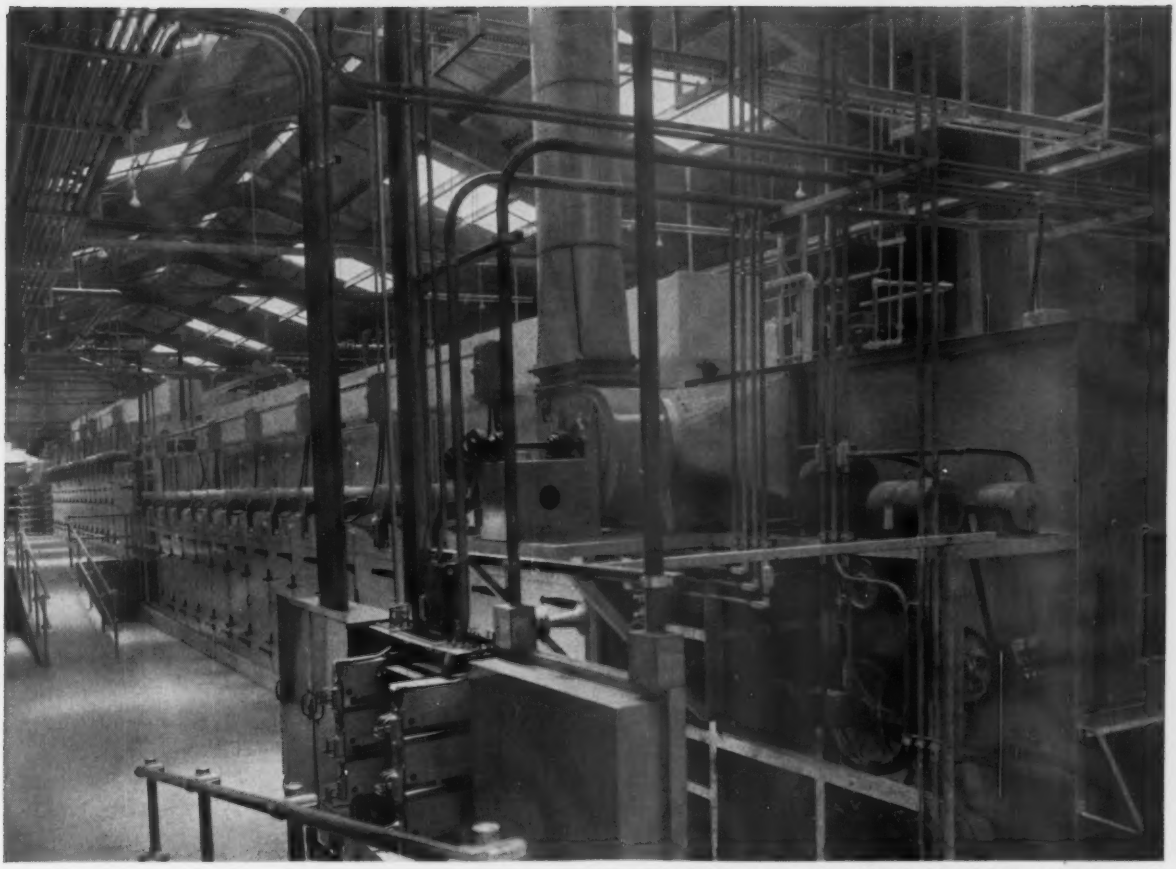
Wohler Foam Tester

► The Wohler Foam Tester, a portable instrument for determining the indentation compression or firmness of rubber latex, urethane and vinyl foams, curled hair, and other flexible cushioning materials, is being marketed by Testing Machines, Inc., 72 Jericho Turnpike, Mineola, N. Y. According to TMI, tests can be made with the

Wohler Foam Tester through a tiny slit in the foam sample. This slit is said to be non-damaging and unnoticeable after completion of the test. Results are obtained in regulation ASTM, RMA, and SPI units. The company reports that the unit originally was designed for testing the compression of latex rubber foam having standard cored construction, and it has proved to be equally suited for testing flexible urethane foams in either slab or cored form. The low friction between metal and urethane foam as contrasted to rubber is said to allow relatively free movement of the mechanism through the foam, making possible accurate indentation compression readings.

Norelco Electron Microscope

► The Norelco EM 200 electron miscroscope, said to provide 200,000X direct magnification and up to 2,000,000X magnification by photographic methods, is being marketed by Philips Electronics, Inc., 750 South Fulton Avenue, Mount Vernon, N. Y. Resolving power of 10 Angstroms or better is guaranteed by the manufacturer. Direct magnifications are indicated or recorded with an accuracy of ±5 per cent and the full range is obtained with a single set of pole pieces. Consisting of a desk-type console and auxiliary cabinet, the EM 200 utilizes accelerating voltages of 40, 60, 80 and 100 Kv, which may be charged during operation.



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Tomorrow's Dryer...Today!

Full automation, operating efficiency, and the absolute in safety — along with high volume production — were the prime requirements listed by United Rubber & Chemical Company when they were in the market for a new dryer recently. The company's standards are exacting and high . . . they wanted, for their modern plant, a dryer that would be *modern for years to come.*

The large dryer Sargent designed and built for them has full push-button operation and control. Every possible safety device, including explosion and fire prevention, is built into the machine. It is giving United Rubber & Chemical Company absolutely dependable high volume quality production. Installed and operating within five weeks after date of delivery, the Sargent features of unusually rugged construction, economy and simplicity of operation are proving themselves every day.

This 32-section, 2-stage master batch dryer is equipped with vibrating feeder and extra-wide conveyor. It is gas-fired, with each of the six zones having its own separate heating system and temperature regulators and controls. The stock leaves the dryer at less than ½ of 1% moisture content. Full-height hinged doors and easy-to-remove panels, a Sargent feature, provide easy access to entire interior of the machine for quick, thorough cleanout. Each fan assembly, including panel, motor and fan rotor, is easily lifted off by removing four clamps. The Sargent-designed perforated flight conveyor has traveling and stationary stock guides to insure a dustless chain. The Sargent-built "No-Lube" chain never needs lubrication. Velometer ports permit airflow measurement in each zone. No air recirculation through the heaters prevents contamination. Tachometers accurately measure conveyor speeds. Automatic cut-off switches prevent any part of machine starting up accidentally while being cleaned. The entire machine automatically shuts off in case of accidental jamming of conveyor, imminent fire in any section, or other mishap, should it occur.

Another example of Sargent creative engineering to meet individual requirements.

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Graniteville, SINCE 1852 Massachusetts

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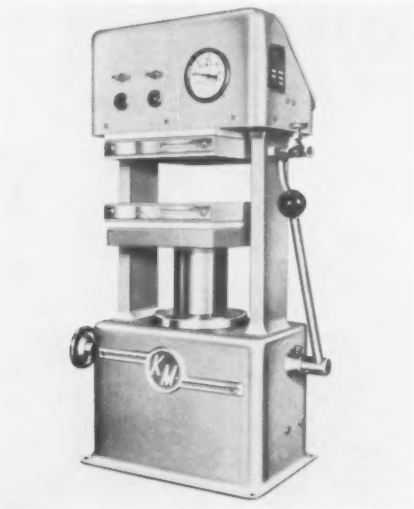
K-M Hydraulic Presses

► Kingsbacher Murphy Co., 9830 Bellanca Avenue, Los Angeles 45, Calif., is manufacturing a

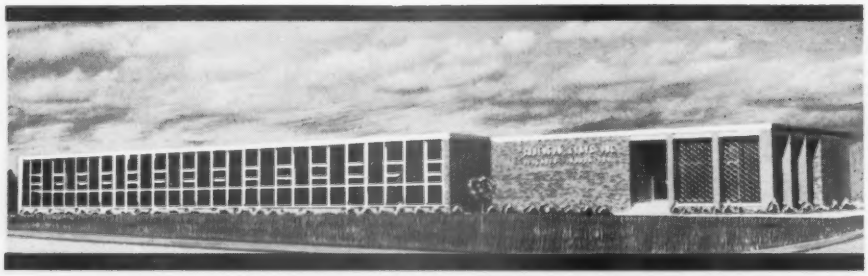


line of hydraulic presses which may be used for molding, laminating, or testing rubber and plastic materials. The manufacturer recommends these presses for applications where controlled heating and pressure are required. Press sizes range from 20 to 75 tons, with platen size varying from 8 by 8 inches to 19 by 19 inches. The platens are constructed of fabricated steel with a cast aluminum interior said to provide proper heat transfer characteristics, good over-all strength, and the prevention of platen warping or pitting. Each platen has its own individual thermoswitch which controls platen temperature, during electrical heating, to 600°F. A metal tube is cast in the platen for water cooling, or for steam heating. According to the manufacturer, the press has a welded steel column frame which provides self alignment and self leveling of the platens. A variety of hydraulic units are offered by the company for closing platens and raising pressure, and both manual and motorized powered pumps are available. Also available are special pressure test gauges, heat control units, and other accessories.

SMS Rubber Specimen Dies

► SMS Instrument Co., P.O. Box 24, Rensselaer, N. Y., is marketing dies for cutting rubber specimens according to ASTM D 624-54. According to the company, the dies are manufactured exactly to ASTM dimensions and feature the original NAEF expulsion, which is said to provide for an economical and careful sample preparation.

OUR NEW RESEARCH LABORATORY



New research laboratory conveniently located at our plant in Gordon, Ga.

A symbol of better research and technical service to our customers

Many of today's well-known kaolin clay products have been developed by Southern Clays' research. We were the first to give you Calcined Clays such as Pigment #33, #34 and Whitetex. As cross link polyethylene and ethylene propylene co-polymers were introduced, we gave you the non-black, reinforcing filler, Translink.

Now, one of the latest steps in our growth is the opening of a new research laboratory with the most modern facilities and equipment available. Our staff will be working on new clay developments as well as offering technical assistance to our many customers in the rubber field.

Do you have a problem with clays? One of our products could be the answer . . . but we must first know the problem. Submit inquiry to our Technical Service Department.

SOUTHERN CLAYS, INC.

33 RECTOR STREET,
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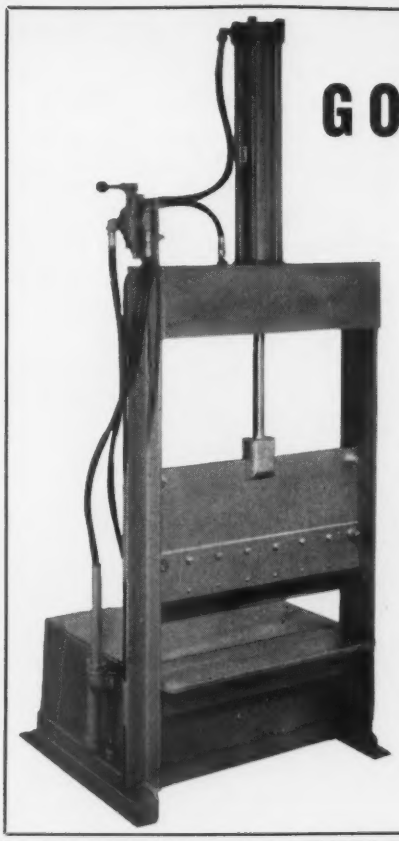
New, Self-Contained Hydraulic

GOODMAN BALE CUTTER



- New Self-Contained Model for Moderate Work Loads
- Larger Units for Higher Production
- Removable Hardened Toolsteel Blades
- Mild Steel Anvil for Cleaner Cutting
- Every Unit Pre-Tested under Power

Newest model Goodman Hydraulic Crude Rubber Bale Cutter is this 2 H.P. Cutter with self-contained power unit. It is ideal for use where up to 12 full bales per day are required. The 5 and 7½ H.P. models, with separate motor pump and oil reservoir, are designed for more capacity or continuous operation.

All Models now offer hardened toolsteel blades (removable for sharpening) and mild steel anvils for a cleaner cut with no adjustment required. Bale clearances are 30" wide x 22" high. Every unit is tested under power and shipped with hydraulic lines either connected or plainly tagged.

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RELEASE-KOTE "CC"
Put an end to sticky mold release problems for good!

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Enthusiastic Release-Kote "CC" users report really big savings in labor and material costs plus increased production! You save two ways because Release Kote costs far less than silicone parting agents, yet goes 50% farther. Parts free mold instantly with little effort. Ends need for extra mold plugging. Imparts eye-appealing sheen to finished product. Available now in industrial quantities.

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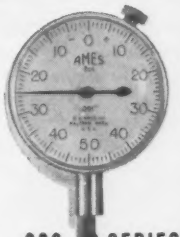
Masters of Measurement

PORTA-CHECK®
A transistorized comparator for fast, accurate measurement to .00001".



200 SERIES
One of four sizes; made to AGD specifications.

For more than half a century, Ames measuring instruments have been regarded as the finest available. Wherever precision is *really* important . . . you'll find Ames indicators, gauges, micrometers and comparators on the job.

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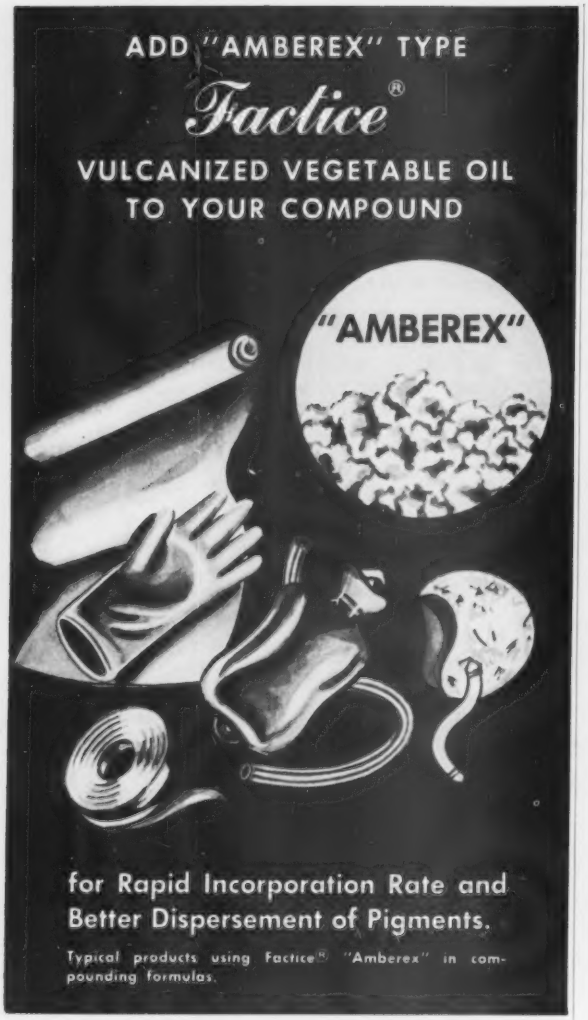

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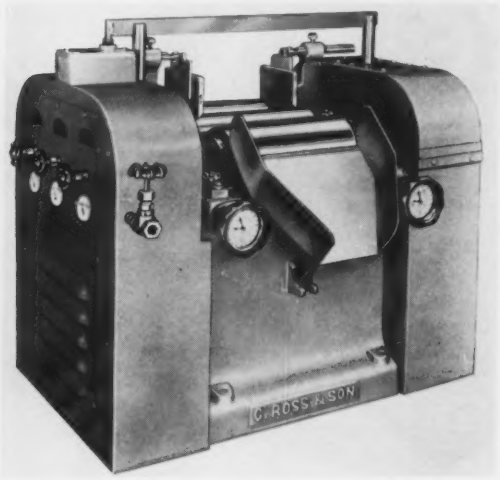
There are six different Amberex types, each having properties for specific applications. The selection of the proper Factice® for a compound is important. Send us your formula for our suggestions. All formulas held in strict confidence. Our trained staff will help in selecting the proper vulcanized vegetable oil for your need . . . Factice®, White, Brown, Neophax or Amberex.

THE STAMFORD RUBBER SUPPLY CO.
STAMFORD, CONN.

Ross Three-Roll Mills

► A line of high speed three-roll mills, fitted with roll pressure recording gauges and automatic thermostatic controlled water inlet valves, has been introduced by Charles Ross & Son Co., 148 Classon Avenue, Brooklyn 5, N. Y. These features, incorporated into the mills, are said to give



more precise control over roll adjustment and temperature for producing the finest dispersions. According to the manufacturer, the pressure recording gauges, built into each adjusting handwheel, assure positive parallel roll settings for uniform dispersions and eliminate uneven wear on rolls. In addition, the gauges enable return to predetermined roll settings without guesswork, and insure the same results for each operation. Mills, in all sizes from 4½ by 10 inches to 16 by 40 inches, are provided with automatic thermostatic control of main inlet or water cooling line for limiting the heat of rolls to a preset temperature between 40° and 180°F. The company claims that when roll temperature exceeds the temperature it is set for, the water inlet valve is automatically opened to allow greater water cooling to reduce the roll temperature to the preset temperature.

Tear Tester Air Grips

► Thwing-Albert Instrument Co., Penn Street and Pulaski Avenue, Philadelphia 44, Penna., has developed air-operated grips for the Elmendorf Tearing Tester. The grips are said to enable an operator to test twice as many samples in less time with greatly reduced operator fatigue. Samples can be inserted and removed in one easy operation without turning any screws. Air-operated grips using air pressures as low as 15 pounds, assure uniform clamping pressure on the sample at all times, according to the manufacturer.

Leading rubber plants all over the world operate our

Hydraulic Belt Presses

We supply belting presses with a working width up to 10 feet.

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#4732—380-ton press; ram diameter, 22"; working pressure, 2000 P.S.I.; pressing surface, 30" x 30".

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Through the years French rubber presses have proved their lasting rigidity, accuracy and unsurpassed economy of operation. Today's French patented features make them better than ever. Write us about your requirements and let us give you full details.

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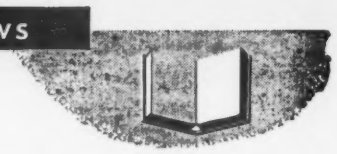
Reviews



Introduction to Natural and Synthetic Rubbers. By D. W. Huke. Published by Hutchinson and Co., Ltd., 178 Great Portland St., London, W.1, England. 5½ x 8½ in. 164 pp. 25s net (approximately $3.50).

The organizational problem in this concise little text has been approached by using natural rubber as the point of departure for discussions of theory, chemistry and technology. In handling the vocabulary problem, the author has been careful to provide working definitions of all the terms on which he builds. The glossary and bibliography provided are supplementary.

The book is split into three basic parts. Following a brief (27 page) introduction to the natural rubber industry, the reader is led into a well-organized section on synthetic rubber. The concluding segment, on the future of rubber, discusses synthetic natural-rubber, radiation of rubber, and several "space-age" rubber applications.

The discussion of the chemistry of the synthetic rubbers is clear, simple and uncluttered, and is based on practical (if, of necessity, incomplete) definitions. The unsophisticated reader is not left to guess the meanings of technical terms. The introduction to the nature of natural rubber, for instance, is begun with a short illustration about sugar. Two pages further on, the reader is well into the meaning of tensile properties, stress-strain characteristics, hysteresis, and other physical properties. The explanations of natural rubber chemistry and isoprene lead directly into a presentation of the chemistry of synthetic rubber and its manufacture and technology. Good use is made of charts, figures and formulas.

In his discussion of synthetic rubber, the author has followed the logical pattern of industry practice, beginning with an explanation of the manufacture of the monomers, butadiene and styrene. He then proceeds to polymerization. Discussion of the technology of general purpose synthetics becomes an introduction to compounding and compounding ingredients.

The special purpose synthetic rubbers, including nitrile, butyl, neoprene, the polysulfide and silicone rubbers, and the polyurethanes are presented in a special section. Again, the sequence has been chosen for its clarity in communicating to the reader.

This book, a good example of what technical writing can be, should be of use where an introductory text on the chemistry of synthetic and natural rubbers is called for.

•

Engineering Professionalism in Industry. Published by the Professional Engineers Conference Board for Industry, Inc., 2029 K St., N.W., Washington 6, D. C. 6 x 9 in. 104 pp. $2.00 (to members of the National Society of Professional Engineers), $4.00 (to nonmembers).

One out of four engineers in industry believes that engineers are thought of as second class professionals, but no industrial managers agree with this opinion. Sixty-one per cent of the engineers employed in industry think there is considerable mal-utilization of engineers, but only thirty per cent of industrial managers agree. More than half the engineers in industry think that higher pay would advance the engineering profession, but only twenty per cent of industrial managers agree.

These are some of the findings reported in this survey, sixth of a series on the basis of extensive "depth" interviews with engineers and managers. Primary ob-

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AMERICAN CHEMICAL SOCIETY CONVENTION
LOUISVILLE, KENTUCKY
APRIL 19, 20 AND 21, 1961

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for an efficient processing agent that allows a free flow at a higher solid content in rubber cements and rubber compounds?

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Detailed literature on DEGELL is available

BEACON Chemical Industries, Inc.

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jective of the study was to find out what engineers and engineering managers mean by professionalism, and how they think it can best be advanced. The engineers and managers interviewed all work for large companies that employ many engineers and are located in various parts of the country from the East to the West Coast. Rubber is among the six major industries that are represented; the others are chemicals, electronics, petroleum, aircraft manufacturing and electrical instruments and machinery.

•

Organic Coating Technology. Vol. II—Pigments and Pigmented Coatings. By Henry Fleming Payne. Published by John Wiley & Sons, Inc., 440 Park Ave. South, New York 16, N. Y. 5¾ x 9 in. 724 pp. $17.50.

Whereas Volume I of this work on organic coatings dealt with oils, resins, varnishes and polymers, this second volume treats with pigments and pigmented coatings. However, since it is intended to be used with the first volume, the chapters and pages of both books are numbered consecutively and a combined index has been provided in the current book.

Volume II contains twelve chapters, covering the following subjects: Fundamentals of Pigmented Coatings, White Pigments, Extender Pigments, Inorganic Color Pigments, Black Pigments, Metal Pigments and Metallic Stearates, Principles of Formulation and Production, Preparation of Surfaces and Methods of Applications, Architectural Paints, Industrial Finishes, and Corrosion-Resistant and Chemical-Resistant Paint Systems.

References to rubber are scattered throughout the volume, but not in any great detail. Brief mention is made of smoked sheet, rubber-based paints, rubber hydrochloride, rubber latex, rubber resins and rubber solvents. Bibliographies appear at the end of each chapter and a subject index is included.

BOOKLETS, CATALOGS, etc.

Dow Latexes. Dow Chemical Co., Midland, Mich. 5¼ x 7 in. 12 pp.

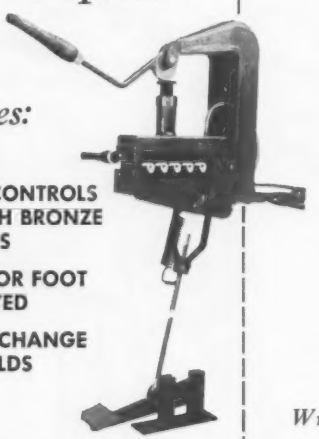
This pocket-size brochure lists in tabular form all of the Dow latexes, their general physical properties, and applications. Styrene-butadiene, polystyrene, vinyltoluene-butadiene, saran, vinyl, and acrylic latex families are included. Some reference is made to experimental materials. End-uses emphasized are in paint, paper, textile, and building products.

•

Woburn Products. Woburn Chemical Corp., 1200 Harrison Ave., Kearny, N. J. 8½ x 11 in. 12 pp.

Specifications on fatty acids, synthetic drying oils, and others organic chemicals are covered in this booklet. The approximate composition and uses of animal fatty acids, fish fatty acids, hydrogenated fatty acids, and hydrogenated glycerides are also given. Included are data on vegetable fatty acids and hydrogenated vegetable fatty acids.

SMACO
Models 200 & 400
Gasket Splicer



Features:
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★ HAND OR FOOT OPERATED
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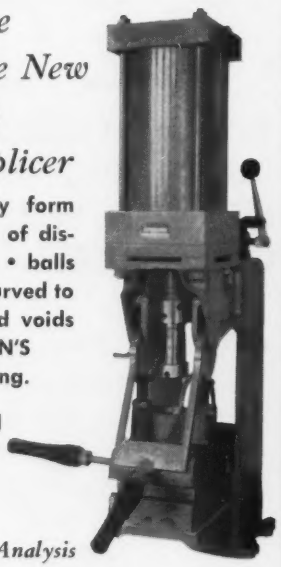
NOW . . . Mold and Splice at the Same Time with the New
SMACO 600
Injection Molding Splicer

Now you can simultaneously form and vulcanize a wide variety of dissimilar shapes—plugs or cords • balls to rods • narrow to broad • curved to straight, or even fill gaps and voids in existing shapes with SIVON'S newest development in splicing.

Eliminates Special Molding and Trimming

A Real Money Saver



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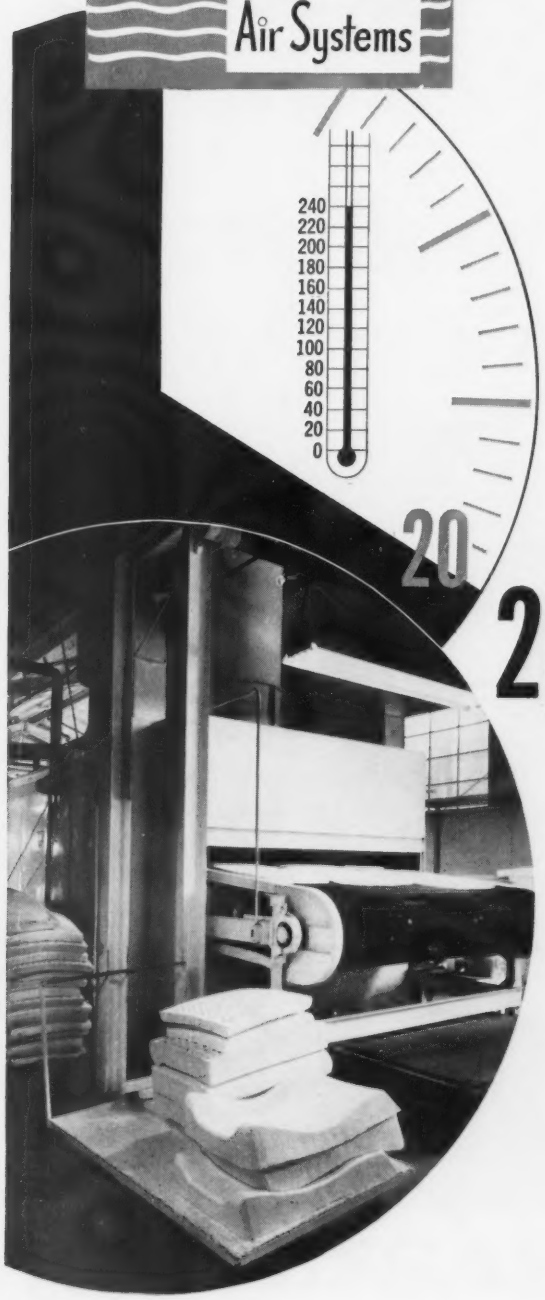
ROSS
Air Systems

Engineered Atmospheres for Better Processing



This refers to a foam rubber processing installation . . . a 65 foot long by 8 foot wide Ross Continuous Dryer and Curing Unit for drying C-Foam mattresses, furniture and aircraft cushions at the American Latex Corp. plant, Hawthorne, California.

Twenty minutes of the 45 minutes total continuous processing time are critically important because it is the curing period. Here is where the carefully conceived and controlled 'Engineered Atmosphere' comes into the picture. The temperature in this zone has to be held very close to 240°F by specially designed introduction, circulation and exhausting of hot air. Timing of travel has to be just right.

20 critical minutes at 240°F

Approaching the discharge end comes a complete reversal . . . a cooling zone, where residual hot spots, which could cause spontaneous combustion of the material in storage, are eliminated by the controlled introduction and circulation of cool air.

In this installation, there are at least four important elements of an 'Engineered Atmosphere': zoning, circulation of hot air, temperature control and cooling . . . all precision problems. Drying, curing, baking, impingement, heating, cooling . . . these are typical of the operations on which Ross Engineers have concentrated their skills for more than thirty-seven years.

Send for your copy of Bulletin S-5

J. O. ROSS

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Organic Solvents and Chemicals. (Second Edition). Chemical Solvents, Inc., 60 Park Place, Newark 2, N. J. 6 x 8¾ in. 64 pp.

Like the first edition, issued in 1954, this revised work covers various organic solvents and chemicals, including alcohols, esters, glycols, ketones, plasticizers, surface active agents and aliphatic naphthas. The format, however, is different, with most of the data presented in tabular form which makes for easier reading and more adequate comparison of the properties of various products with others in the same chemical group. Other features of this edition include formulas for completely and specially denatured alcohols, a table for gauging the contents of drums, and a temperature conversion chart.

•

Bakelite Vinyl Resins for Plastisols and Organosols. (Bulletin J-2148). Union Carbide Plastics Co., 270 Park Ave., New York 17, N. Y. 8¾ x 11 in. 24 pp.

Formulators and users of vinyl plastisols and organosols will find that this working manual covers many aspects of formulation, processing methods and applications. There are tables on plasticizers for specific properties, plasticizers in plastisols, coloring pigments and fillers generally used in vinyl dispersions, and approximate maximum shear rates in various viscometers. The organosol section contains graphs and discussions on preparation of organosols and applications in spread coating, foaming, dip coating, molding, spray coating and extrusion coating.

Mooney Recorders. Scott Testers, Inc., 85 Blackstone St., Providence 1, R. I. 8½ x 11 in. 2 pp.

Two types of electronic strip chart recorders designed for use with Scott Model NBS and Model STI Mooney Shearing Disc Viscometers are described in this bulletin. Included are details and illustrations of the standard single-pen type recorder for direct readings of viscosity in Mooney units, and a new two-pen type recorder which simultaneously provides a direct reading of viscosity in Mooney units and a record of the actual temperature within the test specimen itself.

•

Barclay Roll Catalog. (Bulletin No. 601). Barclay Machine, Inc., Salem, Ohio. 8½ x 11 in. 4 pp.

This handy new bulletin describes and illustrates the construction of rolls with stub shafts and through shafts —rolls with fabricated bodies and cast bodies, alloy rolls, stainless steel rolls, rubber-covered and plastic-covered rolls, and many other types. Some of the rolls described are of direct interest to the rubber manufacturing industry, including those for coating and spreading machines. Schematics of each type roll are shown.

•

Multipress. (Bulletin 195-B.) Denison Engineering Division, American Brake Shoe Co., 1160 Dublin Road, Columbus 16, Ohio. 8½ x 11 in. 4 pp.

This illustrated bulletin gives general data on the Multipress line, including the new R, S, and T series. These units are available in a variety of bench-type models with capacities ranging from 1 to 12 tons, as well as floor models with capacities ranging from 4 to 150 tons. Standard Multipress accessories are also described in the brochure.

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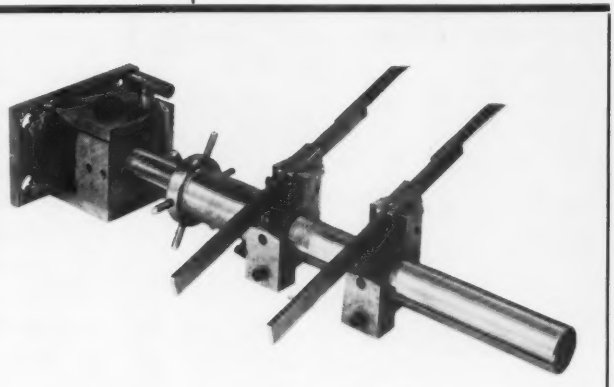

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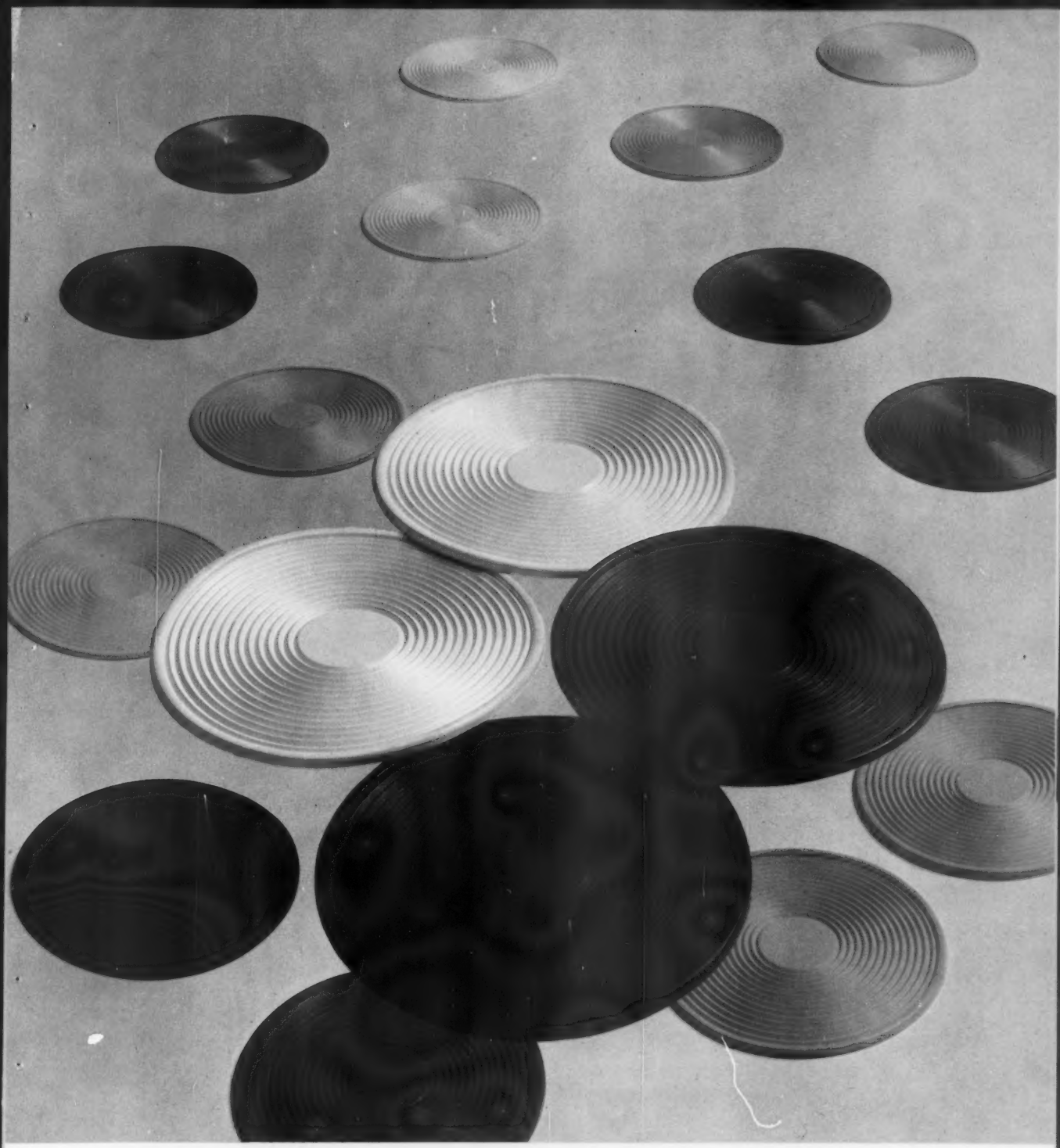

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DESCRIPTION

Physical form	bale
Weight of bale (approximate)	75 lb.
Packaging method	talc dusted
Package colour code	white on green
Monomers	butadiene and acrylonitrile
Typical ACN content	38.5%
Polymerization system	low temperature
Stabilizer type	non-staining
Raw polymer viscosity (ML-4 @ 212°F)	47
Specific gravity	0.96

Compound Applications for Polysar Krynac 805

1 Printing plates and printing rolls with low plasticizer content
2 Hose tube stocks with low plasticizer content
3 Roll cover stocks
4 Friction stocks
5 Calendered stocks
6 High hardness stocks
7 Sponge stocks

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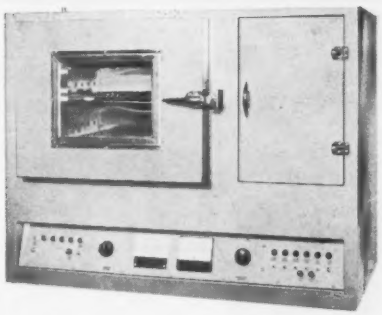
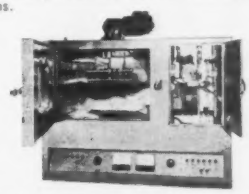


Orec 0300 Series employ an *electronic-chemical loop feed back servo system to achieve and precisely maintain chamber ozone concentrations.



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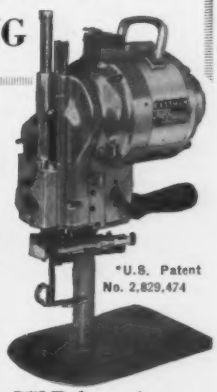

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MARKET REPORTS

TRENDS
NEWS
PRICES

Natural Rubber

The price of natural rubber on the New York Commodity Exchange moved in a range of 200 points since our last report (March 1), high for the period being 31.25c reached on March 20, and low being 29.25c reached on March 1, 2, and 3. The average price of spot rubber for the month of March was 30.22c based on 22 trading days. This compares with an average of 29.00c in the previous month.

Analysts at Merrill Lynch, Pierce, Fenner & Smith point out that the most talked about feature of the rubber market during the last few weeks has been the sharp rise in open interest on the Commodity Exchange. From the end of February, this figure rose from a low of 399 to 756 on March 27. This exceeds the high of 1960 which was reached in mid-April.

The sharp sell-off during last year put natural prices at a level where it could compete with synthetic rubber. Also, consumers are expected to come into the market soon to satify anticipated needs for May and June. The unsettled Far East situation may also have added to speculative enthusiasm.

New Standard Contract

The introduction of the new Standard rubber contract has brought with it somewhat reduced futures activity. Because the old is going out and the new is coming, some hesitancy has been evident in the taking of new positions until broader interest has developed.

With the introduction of the Standard contract, the tendency of Russian buying has been on the up-swing. Since the United States is a natural rubber importer, direct competition with this buying source may once again begin to have an upward pressure on prices.

However, among factors working to restrict price advances is the GSA holding of well over 300,000 long tons of rubber for sale. The trade points out that synthetic rubber technology has advanced to such a level that too high prices for natural will cause an accelerated swing to synthetic.

Foreign Markets

The foreign markets, especially London, have shown the same features as the New York market. The revaluation of some continental currencies has been named as a factor in the heavy buying interest from the Continent. Consumer inventories were thought to have been run down in anticipation of this move. The advance may also have been prompted by dealer short covering of positions taken at or near the lows of the market. Since the Board of Trade has only small quantities of stockpile rubber available for disposition, this source of rubber is being discounted as to its importance in influencing prices.

NEW YORK, APRIL 3, 1961

Price Data

Closing Rubber Prices on New York Commodity Exchange

FROM MARCH 1 TO MARCH 31

Mar.	Spot	May	July	Sept.	Sales
1	29.25	29.00	28.83	28.65	56
1	29.25	28.80	28.65	28.50	70
3	29.25	28.75	28.60	28.30	31
4	....	....	....	....	..
5	....	....	....	....	..
6	29.75	29.40	29.20	29.10	19
7	30.00	29.55	29.30	29.20	41
8	30.00	29.60	29.30	29.25	42
9	30.38	29.75	29.65	29.55	42
10	30.00	29.45	29.20	29.05	34
11	....	....	....	....	..
12	....	....	....	....	..
13	30.38	30.00	29.85	29.65	37
14	30.50	30.30	29.98	29.85	87
15	30.50	30.50	30.25	30.10	45
16	31.00	30.90	30.63	30.50	78
17	30.63	30.60	30.15	30.05	79
18	....	....	....	....	..
19	....	....	....	....	..
20	31.25	31.10	30.80	30.55	66
21	30.75	30.50	30.20	30.00	100
22	30.25	29.90	29.50	29.45	110
23	30.00	29.95	29.65	29.45	115
24	30.13	30.10	29.98	29.80	78
25	....	....	....	....	..
26	....	....	....	....	..
27	30.13	29.70	29.60	29.33	55
28	30.50	30.00	29.75	29.65	33
29	30.50	30.25	30.08	29.86	31
30	30.25	30.05	29.90	29.75	48
31	....	....	....	....	..

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.30¼
May	.29⅞
July-Sept.	.29⅝
Thin Latex Crepe:	
Spot	.32¼
Thin Brown Crepe, No. 2	.25½
Flat Bark Crepe	.20½

London Market
(Standard Smoked Sheets)

May	29.58 — 29.87
July-Sept.	29.58 — 29.87

Singapore Market
(Standard Smoked Sheets)

May	27.92 — 28.00

Middling Upland Quotations

	Feb. 28	Mar. 30		
	Close	High	Low	Close
May	33.03	33.07	33.01	33.04
July	33.52	33.62	33.54	33.58
Oct.	34.06	34.29	34.19	34.28

Notes & Quotes

Sir John Hay, a Malayan rubber industry leader, in a recent address in London observed: "Accepting the view that the natural rubber industry is entering upon a new phase of more intensified competition with synthetics, I am, nevertheless, confident that the efficient producer can meet such competition and continue to operate profitably."

Synthetic Rubber

The Rubber Manufacturers Association reports that in the first two months of the current year a total of 207,859 long tons of all types of synthetic rubber were produced in the United States. This compares with the 257,076 long tons produced in the first two months of the previous year.

As for consumption, in the first two months of this year, 163,205 long tons of all types of synthetic rubber were used in the United States against the 188,336 long tons consumed in the first two months of 1960.

It will thus be seen that 1961 has made rather an inauspicious beginning as far as synthetic rubber production/consumption are concerned. What is of interest, however, are the ratios involved.

Synthetic Ratio Growing

In the first two months of 1960, synthetic rubber consumption represented 67.09 per cent of all the new rubber consumed during the period. In the first two months of this year, the ratio of synthetic to new rubber consumed stood at 70.89 per cent.

One would not want to read too much into these figures. It will be remembered, however, that at the end of February, 1960, Number 1 Ribbed Smoked Sheet was selling at a 41c per pound level. Number 1 Ribbed Smoked Sheet was selling for slightly less than 30c per pound at the end of 1960.

Even with these rather large differences in price and the present lower price for natural, the synthetic-new rubber ratio has grown this year. Judging by these figures alone, one would almost conclude that the price of natural is no longer a dominant factor. Important, yes, but not an over-riding consideration.

One may carry this line of thinking a step further. It may be that the 30c figure for natural carried so long in the minds of many as a pivotal price in market competition is no longer valid. It may very well be that, more realistically, the market reacts at a somewhat lower figure.

Re-examination Necessary

Naturally enough, two months do not make a year. We shall have to re-examine all the factors in a few months time and see where our reasoning has brought us. Suffice to say that at this point there is every indication that the synthetic-new rubber ratio at the end of 1961 will be over the 70 per cent mark.

Will the synthetic-natural ratio stabilize at a 70-30 level? Will the percentage of synthetic continue to grow? What will be the impact of the stereo rubbers? What of the political situation? What of the stockpile? We will have to wait and see.

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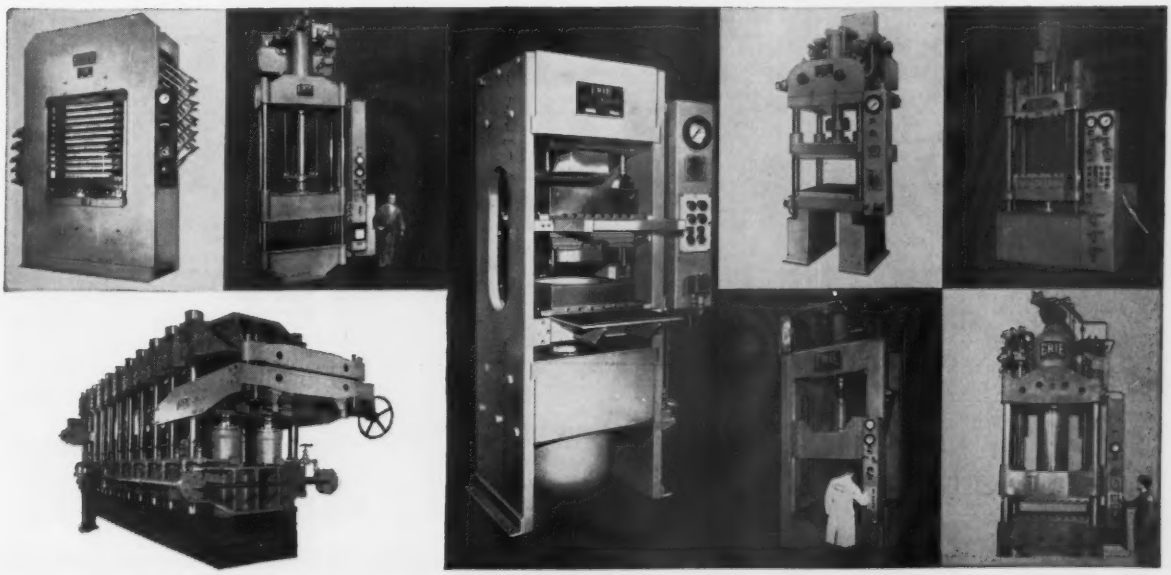

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(per pound carload)

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Chemigum N6	.5000
Chemigum N6B	.5000
Chemigum N7	.5000
Chemigum N8	.5000
Chemigum N600	.5000
Herecol N-33	.6800
Hycar 1001 and 1041	.5800
Hycar 1002	.5000
Hycar 1014	.6000
Hycar 1042 and 1043	.5000
Hycar 1051	.5800
Hycar 1052	.5000
Hycar 1053	.5000
Hycar 1072	.6400
Hycar 1203	.4600
Hycar 1312	.5000
Hycar 1411	.6200
Hycar 1432	.5900
Hycar 1441	.6200
Paracril AJ	.4850
Paracril B and BJ	.5000
Paracril BLT and BJLT	.5000
Paracril C and CLT	.5800
Paracril CV	.6300
Paracril D	.6500
Paracril 18-80	.6000
Paracril OZO	.4600
Polysar Krynac 800	.5000
Polysar Krynac 801	.5800
Polysar Krynac 802	.5000
Polysar Krynac 803	.5000

Butadiene-Styrene Types

Ameripol 1000	.2410
Ameripol 1001	.2410
Ameripol 1002	.2435
Ameripol 1006	.2410
Ameripol 1006 (crumb)	.2475
Ameripol 1007	.2410
Ameripol 1009	.2475
Ameripol 1009 (crumb)	.2590
Ameripol 1011	.2475
Ameripol 1012	.2425
Ameripol 1012 (crumb)	.2490
Ameripol 1013	.2410
Ameripol 1013 (crumb)	.2615
Ameripol 1500 and 1501	.2410
Ameripol 1502	.2410
Ameripol 1606	.1900
Ameripol 1703	.2060
Ameripol 1705	.2035
Ameripol 1707	.1910
Ameripol 1708	.1910
Ameripol 1710	.1885
Ameripol 1712	.1885
Ameripol 1805	.1550
Ameripol 1808	.1480
Ameripol 1809	.1545
Ameripol 1810	.1400
Ameripol 4600	.2410
Ameripol 4601	.2410
Ameripol 4604	.2410
Ameripol 4651	.1770
Ameripol 4659	.1820
Ameripol 4660	.1870
Ameripol 4664	.1845
Ameripol 4667	.2080
Ameripol 4700	.1750
Ameripol 4756	.1545
Ameripol 4758	.1450
Ameripol 4759	.1598
Ameripol 4760	.1576
Ameripol 4761	.1710
ASRC 1000	.2410
ASRC 1001 and 1004	.2410
ASRC 1006	.2410
ASRC 1009	.2475
ASRC 1018	.2700
ASRC 1019	.2650
ASRC 1500	.2410
ASRC 1502	.2410
ASRC 1503	.2625
ASRC 1703	.2060
ASRC 1708	.1910
ASRC 1712	.1885
ASRC 1713	.1750
ASRC 3105 and 3106	.2410
ASRC 3110	.2600
Baytown B-129	.1960
Baytown B-134	.1900
Baytown B-172	.1825
Baytown 1600	.1930
Baytown 1601	.1930
Baytown 1602	.1930
Baytown 1801	.1760
Baytown 1803	.1740
Baytown 1811	.1569
Baytown 8675	.1820
Baytown 8676	.1876
Baytown 8677	.1820
Baytown 8678	.2080
Baytown 8679	.2022
Baytown 8680	.1775
Baytown 8681	.1835
Baytown 8775	.1545
Baytown 8776	.1679
Baytown 8777	.1550
Baytown 8778	.1480
Baytown 8779	.1496
Baytown 8780	.1507
Baytown 8781	.1655
Baytown 8782	.1583
Baytown 8783	.1515
C-102 (Shell)	.2300
Carbomix 1606	.1820
Carbomix 1608	.1845
Carbomix 1609	.2080
Carbomix 1808	.1480
Carbomix 1809	.1545
Carbomix 1811	.1569
Carbomix 1813	.1640
Carbomix 1814	.1545
Carbomix 1815	.1496
Carbomix 1817	.1715
Carbomix 3761	.1576
Carbomix 3764	.1685
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Copo 1500	.2410
Copo 1502	.2410
Copo 1505 NS	.2610
Copo 1507	.2410
Copo 1510	.2410
Copo 1712	.1885
Copo 1713	.1750
Copo 1714	.1725
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FR-S 158	.3000
FR-S 173	.2060
FR-S 178	.1910
FR-S 181 and 182	.2410
FR-S 184	.1885
FR-S 1000	.2410
FR-S 1001	.1410
FR-S 1004 and 1006	.2410
FR-S 1007	.2410
FR-S 1009	.2475
FR-S 1010	.2600
FR-S 1012	.2425
FR-S 1013	.2410
FR-S 1014	.2810
FR-S 1500 and 1502	.2410
FR-S 1703	.2060
FR-S 1710 and 1712	.1885
Gentro 1500	.2410
Gentro 1712	.1885
Gentro-Jet 9152	.2080
Gentro-Jet 9153	.1820
Gentro-Jet 9154	.1845
Gentro-Jet 9250	.1580
Gentro-Jet 9251	.1640
Gentro-Jet 9252	.1670
Gentro-Jet 9275	.1500
Naugapol 1015	.3500
Naugapol 1016	.2650
Naugapol 1018	.2700
Naugapol 1019	.2650
Naugapol 1022	.3050
Naugapol 1023	.3300
Naugapol 1503	.2625
Naugapol 1504	.3500
Naugapol 6003	.2700
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OB-102 (Shell)	.1825
OB-104 (Shell)	.1475
OB-106 (Shell)	.1510
OB-110 (Shell)	.1410
OB-111 (Shell)	.1540
OB-113C (Shell)	.1750
OB-114C (Shell)	.1420
OB-116 (Shell)	.1810
Philprene 1000	.2410
Philprene 1006	.2410
Philprene 1009	.2475
Philprene 1018	.2700
Philprene 1019	.2650
Philprene 1500 and 1502	.2410
Philprene 1503	.2625
Philprene 1601	.1930
Philprene 1603	.1960
Philprene 1605	.1900
Philprene 1606	.1820
Philprene 1608	.1845
Philprene 1609	.2080
Philprene 1703	.2060
Philprene 1708	.1910
Philprene 1712	.1885
Philprene 1803	.1740
Philprene 1805	.1550
Philprene 1808	.1480
Plioflex 1006	.2410
Plioflex 1500C	.2410
Plioflex 1502	.2410
Plioflex 1507	.2410
Plioflex 1508	.2410
Plioflex 1510	.2410
Plioflex 1710C and 1712C	.1885
Plioflex 1713	.1750
Plioflex 1714C	.1725
Plioflex 1773	.2060
Plioflex 1778	.1910
Polysar Kryflex 200	.2510
Polysar Krylene	.2410
Polysar Krylene NS	.2410
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Polysar S-X 371	.2550
Polysar SS-250	.2875
S-1000	.2410
S-1002	.2435
S-1006	.2410
S-1009	.2475
S-1011	.2475
S-1013	.2410
S-1500	.2410
S-1502	.2410
S-1509	.2410
S-1703	.2060
S-1707	.1910
S-1709	.1885
S-1710	.1885
S-1712	.1885
S-1778	.1910
S-7501	.2410
S-7652	.1960
S-7702	.1750
SP-102	.3000
SP-103	.3000
Synpol 1000 and 1001	.2410
Synpol 1002	.2435
Synpol 1006	.2410
Synpol 1007	.2410
Synpol 1009	.2475
Synpol 1012	.2425
Synpol 1013	.2410
Synpol 1061	.2410
Synpol 1500	.2410
Synpol 1502	.2410
Synpol 1551	.2410
Synpol 1703	.2060
Synpol 1707	.1910
Synpol 1708	.1910
Synpol 1712	.1885
Synpol 8103	.2401
Synpol 8151	.1820
Synpol 8152	.1860
Synpol 8200	.1910
Synpol 8201	.1750
Synpol 8202	.1725
Synpol 8208	.1750
Synpol 8255	.1480
Synpol 8253	.1584
Synpol 8254	.1545
Synpol 8266	.1598
Synpol 8267	.1640

Butyl Rubbers

Enjay Butyl 035 and 150	.2300
Enjay Butyl 165 NS	.2400
Enjay Butyl 215	.2300
Enjay Butyl 217	.2300
Enjay Butyl 218	.2300
Enjay Butyl 268 NS	.2400
Enjay Butyl 325	.2300
Enjay Butyl 365 NS	.2400
Polysar Butyl 100	.2450
Polysar Butyl 101	.2775
Polysar Butyl 200 and 300	.2450
Polysar Butyl 301	.2550
Polysar Butyl 400	.2450

Chlorosulfonated Polyethylene

Hypalon 20	.4700
Hypalon 30	.6000
Hypalon 40	.5000

SYNTHETIC RUBBER POLYMERS

Fluoroelastomers

Fluorel	$10.25 [2]
Kel-F 3700 and 5500	$16.00 [2]
Viton A and A-HV	$10.00 [2]
Viton B	$13.00 [2]

Neoprene

	(prices f.o.b.)
Neoprene Types AC and CG	.5500 [3]
Neoprene Type AD	.5500 [3]
Neoprene Type FB	.6500 [2]
Neoprene Type GN	.4100 [3]
Neoprene Type GN-A	.4100 [3]
Neoprene Type GRT	.4200 [3]
Neoprene Type KNR	.7500 [3]
Neoprene Type S	.4200 [3]
Neoprene Type W	.3900 [3]
Neoprene Type WB	.4100 [3]
Neoprene Type WHV	.3900 [3]
Neoprene Type WRT	.4500 [3]
Neoprene Type WX	.4100 [3]

Polysulfide Rubbers

	(prices f.o.b.)
Thiokol Type A	.5000 [3]
Thiokol Type FA	.6900 [3]
Thiokol Type ST	1.2500 [3]

Silicone Rubbers*

	(prices f.o.b.)
GE (compounded)	2.50 [3]
GE Silicone Gum (not compounded)	4.00 [3]
Silastic (compounded)	2.50 [3]
Silastic (gums)	4.00 [3]
Union Carbide (gums)	4.00 [3]
Union Carbide (compounds)	2.50 [3]

Latex

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene N-300	.4600 [1]
Butaprene N-400 and N-401	.5400 [1]
Chemigum 200	.4800 [3]
Chemigum 235	.5300 [3]
Chemigum 236	.5300 [3]
Chemigum 245	.4500 [3]
Chemigum 246	.4500 [3]
Chemigum 247	.4500 [3]
Chemigum 248	.4500 [3]
Hycar 1512	.4500 [3]
Hycar 1551	.5300 [3]
Hycar 1552	.4500 [3]
Hycar 1561	.5300 [3]
Hycar 1562	.4500 [3]
Hycar 1571	.5300 [3]
Hycar 1572	.4500 [3]
Hycar 1577	.4500 [3]
Nitrex 2612	.4500 [1]
Nitrex 2616	.5300 [1]
Nitrex 2620	.4500 [1]
Nitrex 2625	.4500 [1]
Tylac 640 and 650	.4500 [1]
Tylac 750	.4900 [1]
Tylac 850	.5300 [1]
Tylac 1640 and 1650	.5400 [1]
Naugatex 2006	.2900 [1]
Naugatex 2105 and 2107	.3200 [1]
Naugatex 2108	.3000 [1]
Naugatex 2113	.2900 [1]
Naugatex J-8174-F	.3200 [1]
Naugatex J-8855	.3000 [1]
Naugatex J-9049	.2750 [2]
Naugatex J-9064	.3050 [1]
Pliolite 2000	.2775 [3]
Pliolite 2001	.2775 [3]
Pliolite 2076	.2900 [3]
Pliolite 2104	.3200 [3]
Pliolite 2105	.3200 [3]
Pliolite 2107	.3200 [3]
Pliolite 2108	.3000 [3]
S-2000 and S-2006	.2600 [3]
S-2101	.2600 [3]
S-2105	.2800 [3]
S-2108	.2900 [3]
Tylac 400	.3000 [3]
Tylac 405, 430, 450-A	.2750 [1]
Tylac 410 and 420	.2900 [1]
Tylac 450-A	.2750 [1]
Tylac 3040 and 3340	.3200 [1]

Butadiene-Styrene Types

CL-101 (Shell)	.2800 [3]
Copo 2000	.2750 [3]
Copo 2101	.3000 [3]
Copo 2102	.3200 [3]
Copo 2105	.3200 [3]
Copo 2108	.3000 [3]
Copo 2109	.2775 [3]
Copo 2110	.3200 [3]
Copo 3852	.3000 [3]
FR-S 110	.3000 [3]
FR-S 150	.3000 [3]
FR-S 151	.2900 [3]
FR-S 174	.2950 [3]
FR-S 176	.2775 [3]
FR-S 2000	.2775 [3]
FR-S 2001	.2775 [3]
FR-S 2002	.3000 [3]
FR-S 2003	.3050 [3]
FR-S 2004	.3050 [3]
FR-S 2006	.2900 [3]
FR-S 2105	.3200 [3]
Naugatex 2000 and 2001	.2750 [1]
Naugatex 2002	.3000 [1]

Neoprene

Neoprene Latex 60	.4000 [3]
Neoprene Latex 571	.3700 [3]
Neoprene Latex 572	.3900 [3]
Neoprene Latex 601-A	.4000 [3]
Neoprene Latex 673	.5000 [3]
Neoprene Latex 735	.3800 [3]
Neoprene Latex 736	.3800 [3]
Neoprene Latex 842-A	.3700 [3]
Neoprene Latex 950	.4700 [3]

Polysulfide Rubbers

Thiokol Type MX	.8000 [3]
Thiokol Type WD-2	1.2500 [3]
Thiokol Type WD-6	.8000 [3]

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid. *Covers a wide range of compounds. Readers are urged to check specific prices with producers.

Suppliers are your Materials Listed in the Market Prices Section?
If not, forward full information to —
Market Editor

RUBBER AGE
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A FULLY AUTOMATIC MACHINE FOR THE
PRODUCTION OF SYNTHETIC RUBBER CRUMB BALES

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★ Out-put—outstandingly high.
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★ Safety Guards—fully interlocked.
★ Operation—completely automatic.
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★ Flashing—barely perceptible.
★ Construction — robust and independently powered.

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MARKETS

(continued)

Reclaimed Rubber

The Rubber Manufacturers Association reports that in the first two months of the current year a total of 42,128 long tons of reclaimed rubber were produced in the United States, compared with the 53,407 long tons produced in the first two months of the preceding year.

As for consumption, in the first two months of 1961, 40,477 long tons of reclaimed rubber were used in the United States against the 52,477 long tons used in the first two months of 1960.

The RMA figures indicate that exports of reclaimed rubber have been holding firm, 2,364 long tons in the first two months of 1960 and 2,174 long tons in the first two months of this year. Stocks remain high. A total of 33,186 long tons were on hand at the end of February, 1961.

(Prices for All Areas Except West Coast)
(Average price, carload quantities, minimum freight allowed)

	per lb.
First Line Whole Tire	.11½
First Line Whole Tire Stainless	.12¼
Second Line Whole Tire	.11
Third Line Whole Tire	.10¾
Fourth Line Whole Tire	.10¼
Black Carcass	.15¾
Peelings	.11½
Butyl Tube	.16
Natural Rubber Black Tube	.17
Natural Rubber Red Tube	.21
Mechanical, Light Color, Low Gravity	.26
Mechanical, Light Color, Medium Gravity	.20

Scrap Rubber

According to figures made available by the Rubber Manufacturers Association, 38,797 long tons of scrap rubber were consumed in the first two months of this year. Stocks at the end of February, 1961, stood at 64,695 long tons, equal to more than three-months consumption.

It is thus evident that consumption of scrap rubber this year is running behind last year's pace. This, of course, is a general reflection of the slower rate at which the entire rubber industry is moving so far this year.

The market for scrap rubber remains uneventful with materials moving in moderate volume. Prices continue steady.

(Prices Delivered Akron)

Mixed tires	ton	14.00
Light colored carcass	lb.	.06
No. 1 peelings	ton	38.00
No. 2 peelings	ton	27.00
No. 3 peelings	ton	20.00
Buffings	ton	14.00
Truck and Bus S.A.G.	ton	20.00
Passenger S.A.G.	ton	20.00
Natural Rubber Red Tubes	lb.	.07½
Natural Rubber Black Tubes	lb.	.07
Butyl Rubber Tubes	lb.	.06¼

Tire Fabrics

The Bureau of the Census has released data on the production of tire cord and fabric for the fourth quarter of 1960. Production (except for chafer fabric) in the fourth quarter last year amounted to 84,000,000 pounds which compares with 85,400,000 pounds in the third quarter.

Total 1960 output at 381,600,000 pounds was 10 per cent below that of 1959, but 9 per cent greater than 1958. Rayon constituted 65 per cent of fourth quarter production, compared with 61 per cent in the third quarter.

Further, rayon comprised 63 per cent of 1960 production compared with 71 per cent in 1959 and 72 per cent in 1958.

The report also showed that the stock of filament yarn held in unopened cases amounted to only a one-week supply for both rayon and nylon. Based on the fourth quarter output, tire manufacturers' stocks of rayon tire cord and cord fabric were reduced from a 6½ to a 6-weeks' supply over the quarter, while nylon went from a 7½ to a 7-weeks' supply.

Here and There

Monsanto Chemical Co. has acquired from American Viscose Corp. its 50 per cent interest in the Chemstrand Corp. in exchange for 3,540,000 shares of Monsanto common stock. Chemstrand thus became a wholly-owned subsidiary of Monsanto. Chemstrand is the nation's second largest producer of nylon and acrylic fibers.

Reeves Brothers, Inc. and Shell Chemical Co. have entered into an agreement to develop polypropylene for its application in the fiber field. Intensive research is already underway toward the development of special grades and modifications of polypropylene which are especially suited for the manufacture of high-grade fibers.

The name "Tyrex," a collective trademark of Tyrex, Inc. for rayon tire yarn and cord, has rolled up high international mileage since its first foreign registration in France less than two years ago. To date, 18 countries have registered it, and applications to register it are in process in 17 others. Registration of Tyrex in the United States was issued in November, 1959.

(Prices f.o.b. Shipping Point)

Rayon Tire Cord

1100	lb.	.57
1650	lb.	.51
2200	lb.	.50

Nylon Tire Cord

840	lb.	.92
1680	lb.	.92

Rayon Graded Fabric

1100	lb.	.69
1650	lb.	.63½
2200	lb.	.63

Cotton Chafers

8.9 oz. (per square yard)	lb.	.71
9.25 oz. (per square yard)	lb.	.72
11.65 oz. (per square yard)	lb.	.66
14.4 oz. (per square yard)	lb.	.75

Liquid Latex

Natural: Production and consumption of natural latex in the United States have been in decline in the early part of this year. According to the Rubber Manufacturers Association, 8,267 long tons of natural latex were imported into the United States in the first two months of this year. This compares with the 11,151 long tons imported into the United States in the first two months of last year.

In the first two months of 1961, a total of 6,925 long tons of natural latex were consumed in the United States, compared with the 10,954 long tons consumed in the first two months of the preceding year.

Natural rubber latex is now selling at a 37-38c per pound level at East Coast ports in car load lots. At this price level, more natural latex should be moving than is now evident. As suggested elsewhere in these pages, however, the standards may have changed somewhat. Or, slackened imports and consumption may only be a reflection of the general lethargy in which all industry finds itself.

Synthetic: The synthetic latices are doing somewhat better than their natural counterparts. In the early part of this year, S-type latices production and consumption were better or equal to monthly production-consumption in the last two months of 1960. The same was true of neoprene and nitrile latices. One cannot draw too many conclusions at this point in the year. Suffice to say that synthetic latex is, in the whole, doing better, while natural latex is not doing as well.

Cotton

The price of middling uplands on the New York Cotton Exchange moved in a range of 50 points since our last report (March 1), high for the period being 33.50c reached on March 28, 29, and 30, and low being 33.00c reached on March 1, 2, and 3. The average price of middling uplands for the month of March was 33.27c based upon 22 trading days. This compares with an average of 32.35c in the previous month.

The U. S. Department of Agriculture reports that cotton production in major foreign Free World exporting countries is much larger this season than a year earlier. Exports, however, are running somewhat behind. Production this season is estimated at 16,200,000 bales (500 pounds gross) or 11 per cent above the 14,600,000 bales grown last season.

There are larger crops in 13 of the 18 countries listed. Cotton exports for specified periods of 1960-61 from principal foreign Free World exporting countries decreased 286,000 bales compared with the same period the previous season. Total exports this season will likely fall somewhat short of last season's record, because stocks in most major importing countries are not maintained in the early part of 1960-61; also exportable supplies in some countries are nearing depletion early in the season.

This NEW 3" x 8" THROPP MILL *expedites* rubber and plastics research

Aided by many years of experience in designing laboratory mills, Thropp engineers have developed this up-to-date 3" x 8" model. It sets new standards for attractive modern design, compactness and economical maintenance.

The new mill, designed for processing small batches, is one of the Thropp family of rubber and plastics mills, ranging in size up to 84". The machine has tilting type guides to facilitate thorough and rapid cleaning and prevent carry-over of color or other contamination to subsequent batches.

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MARKET PRICES

CHEMICALS & COMPOUNDING INGREDIENTS

APRIL 3, 1961

Prices are, in general, f.o.b. works and cover the domestic markets only. Export prices, as a rule, are usually slightly higher, due to packing regulations, special handling, etc.

Abbreviations: bbls., barrels; c.l., carload; cyl., cylinder; dlvd., delivered; dms., drums; eqld., equalized; l.c.l., less than carload; M.B. masterbatch; min., minimum; ref., refined; sap., saponified; sp., special; syn., synthetic; t.c., tank cars.

*Trademark. †For Export Only.

The arrangement of this section closely follows the Chemical Section of the 1961 RUBBER RED BOOK. Readers are referred to that edition for the correct classification of any material or brand name. Suppliers of every material are contacted for price information. However, only those materials are listed for which quotations have been furnished within the past six months. The quotations are not guaranteed and prospective purchasers should contact suppliers for information. Suppliers are requested to send current price information to the Market Editor, RUBBER AGE.

ACCELERATORS

A-1 (Thiocarbanilide)*	lb.	.74 -	.81
A-32*	lb.	.66 -	.80
A-100*	lb.	.52 -	.66
Accelerator No. 8*	lb.	— —	1.25
Accelerator—49*	lb.	.60 -	.61
Accelerator 108*	lb.	—— -	.92
Accelerator—552*	lb.	—— -	2.25
Accelerator—808*	lb.	.66 -	.68
Accelerator—833*	lb.	1.17 -	1.19
Accelerator B*	lb.	—— -	.92
Altax*	lb.	.54 -	.56
Amax*	lb.	.75 -	.77
No. 1*	lb.	.71 -	.73
Ancap*(†)	lb.	.38 -	.40
Ancatax*(†)	lb.	.48 -	.50
Ancazate BU (ET & ME)*(†)	lb.	—— -	1.07
Ancazide ET*(†)	lb.	—— -	1.07
ME*(†)	lb.	—— -	1.14
Arazate*	lb.	—— -	2.25
Arquad 12*	lb.	.55 -	.61
Beutene*	lb.	.66 -	.68
Bismate, Rodform*	lb.	—— -	3.00
Butazate 50D*	lb.	.87 -	.89
Butyl Eight*	lb.	1.10 -	1.35
Butyl Namate	lb.	.45 -	.50
Captax*	lb.	.44 -	.46
C-P-B*	lb.	—— -	1.95
Cumate, Rodform*	lb.	—— -	1.45
Cydac*	lb.	.71 -	.73
Delac S*	lb.	.71 -	.73
DIBS*	lb.	—— -	.85
Diorthotolyguanidine	lb.	.69 -	.70
Dipac*	lb.	—— -	.85
Diphenylguanidine	lb.	.51 -	.52
Dithiocarbamates			
Cyzate B & E	lb.	.85 -	.89
El-Sixty*	lb.	.62 -	.69
Ethazate*	lb.	—— -	1.04
50D*	lb.	.87 -	.89
Ethyl Thiurad*	lb.	—— -	1.04
Ethyl Tuex*	lb.	—— -	1.04
Ethylac*	lb.	.93 -	.95
Geigy Amines	lb.	.46 -	.52
Guantal*	lb.	.62 -	.69
Hepteen Base*	lb.	—— -	1.85
Kure-Blend MT*	lb.	—— -	.70
Ledate, Rodform*	lb.	—— -	1.04
MBT-XXX*	lb.	.55 -	.57
MBTS Grains*	lb.	.54 -	.56
Merac*	lb.	.75 -	1.05
Mercaptobenzothiazol	lb.	.44 -	.46
Mercaptobenzothiazyl Disulfide	lb.	.54 -	.56
Mertax*	lb.	.50 -	.57
Methazate*	lb.	—— -	1.04
Monex*	lb.	—— -	1.14
Mono Thiurad*	lb.	—— -	1.14
2-MT	lb.	.88 -	.90
NA-22* (for neoprene)	lb.	—— -	1.05
NOBS No. 1*	lb.	.71 -	.73
Special*	lb.	.75 -	.77
O-X-A-F	lb.	.55 -	.57
Pennac SDB*	lb.	.45 -	.48
Pentex*	lb.	—— -	1.24
Flour*	lb.	—— -	.30
Permalux (Neoprene)*	lb.	—— -	2.25
Phenex*	lb.	.60 -	.65
Polyac*	lb.	—— -	1.85
R-2 Crystals*	lb.	—— -	4.55
Rotax*	lb.	.50 -	.52
RZ-50-A* and B*	lb.	.70 -	1.00
Santocure*; NS*	lb.	.71 -	.78
.26*	lb.	.75 -	.82
Selenac* (Ethyl, Methyl)	lb.	—— -	3.00
Seleram, Ethyl	lb.	—— -	3.00
Setsit-5*	lb.	.75 -	1.05
9*	lb.	.85 -	1.15
SPDX-GH*	lb.	.77 -	.79
GL*	lb.	1.20 -	1.30
Tellurac*	lb.	—— -	1.75
Tellurac Rodform (80/20)	lb.	—— -	1.40
Tepidone*	lb.	.45 -	.45
Tetrone A*	lb.	—— -	1.98
Thiate A*	lb.	.88 -	——
B*	lb.	1.05 -	1.25
Thiazole ZMBT	lb.	.55 -	.57
Thiofide*	lb.	.54 -	.61
Thionex*	lb.	—— -	1.14
Thiotax*	lb.	.44 -	.51
Thiram, Ethyl	lb.	—— -	1.04
Methyl	lb.	—— -	1.14
Thiurad*	lb.	—— -	1.14
Thiuram E*	lb.	—— -	1.04
M*	lb.	—— -	1.14
Cyuram DS & MS	lb.	1.14 -	1.14
Trimene*	lb.	.56 -	.58
Base*	lb.	1.03 -	1.06
Triphenyl Guanidine	lb.	—— -	.90
Tuads* (Ethyl)	lb.	—— -	1.04
Tuads* (Methyl)	lb.	—— -	1.14
Tuex*	lb.	—— -	1.14
Ultex*	lb.	1.15 -	1.20
Unads*	lb.	—— -	1.14
Vulcacure NB*	lb.	.45 -	.45
NS*	lb.	.75 -	1.05
TMD*	lb.	—— -	1.14
ZB*, ZE*, ZM*	lb.	.85 -	.89
Z-B-X*	lb.	—— -	2.45
Zenite*	lb.	.54 -	.56
Zenite A*	lb.	.69 -	.71
Zenite AM*	lb.	.76 -	.78
Zenite Special*	lb.	.55 -	.57
Zetax* (uncoated)	lb.	.55 -	.57
Zimate* (Butyl)	lb.	—— -	1.04
Zimate* (Ethyl)	lb.	—— -	1.04
Zimate* (Methyl)	lb.	—— -	1.04
Zimate Slurry 50% solids content (Butyl, Ethyl & Methyl)	lb.	.85 -	.89
Ziram, Butyl	lb.	—— -	1.04
50% Dispersion	lb.	.85 -	.89
Ziram, Ethyl	lb.	—— -	1.04
50% Dispersion	lb.	.85 -	.89
Ziram, Methyl	lb.	—— -	1.04
50% Dispersion	lb.	.85 -	.89

ACTIVATORS

Blue Lead Sublimed	lb.	.17 -	.18
Cottonseed Fatty Acids			
Drew Wecoline C*	lb.	.17¾ -	.19
Wochem 210* and 211*	lb.	.14¾ -	.17¼
Fish Oil, Hydrogenated, Fatty Acid			
Century Hydrex 440	lb.	.11½ -	.14
DAR-S*	lb.	.11½ -	.14
DAR-HY*	lb.	.16 -	.18½
Groco 56*	lb.	.11½ -	.14
Hydrofol Acids*	lb.	.11½ -	.20½
Hyfac 430*	lb.	.17 -	.19½
Neo-Fat H.F.O.*	lb.	.14½ -	.15¾
Neutrex*	lb.	.13¾ -	.16¼
Stearite*	lb.	.11¾ -	.14¼
Talene*	lb.	.16¼ -	.18¾
Wecoline 200*	lb.	.14¾ -	.16
1000*, 1500*	lb.	.12 -	.13¼
Wochem 730*	lb.	.10¾ -	.13¼
731*	lb.	.15¼ -	.17¾
732*	lb.	.16¼ -	.18¾
Lime, Hydrated			
Arrowhead*	ton	—— -	21.00
Marblehead*	ton	—— -	19.25
Sierra*	ton	—— -	22.50
Litharge			
Eagle-Picher* (c.l.)	lb.	.13¾ -	——
National Lead*	lb.	—— -	.13¾
SB*	lb.	—— -	.18½

ACTIVATORS (Cont'd)

Magnesium Oxide, Heavy			
DCI 601*	lb.	.25¼ -	——
General Magnesite 500*	lb.	.05½ -	.06
600*	lb.	.06½ -	.07
Kaiser 325*	lb.	.03½ -	.06½
Michigan No. 15*	lb.	.05½ -	.06½
Morton's Magnesia	lb.	.25¼ -	——
Magnesium Oxide, Light			
Carey Mag*	lb.	.25¼ -	.26
DCI Technical*	lb.	.21½ -	.23½
General Magnesite* (neoprene grade)	lb.	.26¾ -	.28¾
General Magnesite No. 101*	lb.	.24¾ -	.27¼
Genmeg MLW*	lb.	.25¼ -	.27¾
Light Calcined Magnesia No. X-01*	lb.	.25¼ -	.26
Maglite D*	lb.	.25¼ -	——
K*	lb.	.25¾ -	.27
L*	lb.	.29¾ -	.30¾
M*	lb.	.27 -	.28½
Seamag*	lb.	.20 -	.20½
Marmag*	lb.	.24¾ -	.26
Michigan No. 30*	lb.	.24¼ -	.26½
Michigan 1782 Magnesia*	lb.	.25¼ -	.26½
Neomag Powder*	lb.	.29¼ -	.30
Pellets*	lb.	.31¼ -	.32
Oleic Acid			
Dar-Chem* 105	lb.	.18 -	.20½
Drew Wecoline OO*	lb.	.17¾ -	.19
Emersol* 210*	lb.	.16½ -	.19
Groco Red Oil	lb.	.18 -	.20½
Neo-Fat 92-04*	lb.	.20½ -	.22½
94-04*	lb.	.18½ -	.20¼
Wochem 310, 311	lb.	.17¼ -	.19¾
Palm Fatty Acids			
Groco 45*	lb.	.15½ -	.18
Neo-Fat*	lb.	.15¾ -	.17¾
Wochem 280*	lb.	.15½ -	.18
281*	lb.	.16 -	.18½
Potassium Oleate (dms.)	lb.	.48 -	.73
Drew 24%*	lb.	.20 -	.73
Red Lead			
Eagle-Picher* (c.l.)	lb.	.14¾ -	——
National Lead*	lb.	.14¼ -	.14¾
No. 2 RM*	lb.	—— -	.18½
Sodium Laurate, 75%	lb.	.64 -	.89
Sodium Oleate, 75%	lb.	.54 -	.79
Paste (dms.)	lb.	.39 -	.64
Sodium Stearate, 75%	lb.	.47 -	.72
Stearic Acid, Single Pressed			
Century 1210*	lb.	.15¼ -	.17¾
Dar-Chem 11*	lb.	.16¾ -	.19¼
Emersol 110*	lb.	.16¾ -	.19¼
Neo-Fat 18-53*	lb.	.14¾ -	.16¾
Stearic Acid, Double Pressed			
Century 1220*	lb.	.15¾ -	.18¼
Dar-Chem 12*	lb.	.17¼ -	.19¾
Emersol 120*	lb.	.17¼ -	.19¾
Groco 54*	lb.	.17¼ -	.19¾
Neo-Fat 18-54*	lb.	.15¼ -	.17¼
Stearic Acid, Other			
Century 1230*	lb.	.17½ -	.20
1240-Supra*	lb.	.17½ -	.20
Extra Pearlstearic*	lb.	.17½ -	.20
Neo-Fat 18*	lb.	.18½ -	.20½
18-58*	lb.	.14¼ -	.16¼
18-61*	lb.	.16¼ -	.18¼
Stearex*	lb.	.11¾ -	.13
Stearite*	lb.	.11¼ -	.13¼
Wecoline 300*	lb.	.15¼ -	.16½
Wochem 720*	lb.	.12¾ -	.14¾
721*	lb.	.12¾ -	.14¾
White Lead Basic Carbonate	lb.	.18 -	.19
White Lead Basic Sulfate	lb.	.17 -	.18
Zinc Laurate			
Laurex*	lb.	.37 -	.39
Zinc Stearate	lb.	.41 -	.46
Aquazinc K.C.*	lb.	.30 -	.55
Crown Brand*	lb.	.39 -	.44

Unclassified Activators

Aktone*	lb.	.21¼ -	.23¼
Barak*	lb.	—— -	.65
Curade*	lb.	.57 -	.59
DCI Magnesium Carbonate*	lb.	.11 -	——
Dibenzo G-M-F	lb.	—— -	2.60
D-B-A*	lb.	—— -	1.95
G-M-F*	lb.	—— -	2.60
Dibutylamine (dlvd.)	lb.	.55½ -	.56½
MODX*	lb.	.38 -	.40
Neo Fat 42-07*	lb.	.10¼ -	.12¼
Ridacto* (dms.)	lb.	.25 -	.26
Snodotte* (dlvd.)	lb.	.18½ -	.21
Vimbra	lb.	.32 -	.38½
Vulklor*	lb.	.88 -	.98

ANTI-COAGULANTS

Aqua Ammonia* (dms.)	lb.	.031 -	.035
M.B.M.C.* (l.c.l.)	lb.	.54 -	.76

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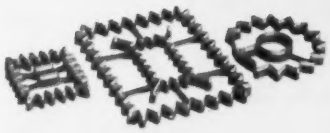

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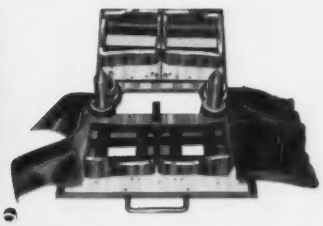

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Regular*	lb.	——	.12
Anhydrol 6991*	lb.	.51	.56
D.C. Antifoam A*	lb.	4.85	5.95
Antifoam A Emulsion*	lb.	1.78	2.58
Antifoam AF Emulsion*	lb.	1.78	2.58
Antifoam B*	lb.	.59	1.06
Defoama W-1701*	lb.	——	.12½
Defoamer A-25*	lb.	——	3.00
Defoamer 630*	lb.	——	.14
Deltyl Prime	lb.	.70	.80
Foamnix*	lb.	.60	1.50
G-E Antifoam SS-24*; 66*	lb.	5.28	6.65
60 Emulsion*	lb.	2.05	3.75
Igepol CO-210	lb.	——	.36
Kessco X-3* (dms.)	lb.	——	.39
X-180*	lb.	——	.28
X-181*	lb.	——	.36½
Nopco 1407*	lb.	.20½	.22½
1497-V*	lb.	.15¼	.17¼
1907-B*	lb.	.22½	.25
JMK*	lb.	.48½	.51
JMU*	lb.	.23¼	.25¼
JMY*	lb.	.23¼	.23½
NDW*	lb.	.21½	.24
Pluronic L61*	lb.	.33½	.39
RS-968*	lb.	.38	.38½
Terpinol Prime No. 1	lb.	.35	.50
Tributyl Phosphate (dms.)	lb.	.52½	.53½
UC SAG 47*	lb.	4.85	6.25
470*	lb.	.61	1.10
VL-520*	lb.	2.68	3.50

ANTIOXIDANTS

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NA2*	lb.	.59	.66
NA3T*	lb.	.54	.61
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FLX*	lb.	.78	.80
L*	lb.	.65	.67
White*	lb.	.57	.59
White Powder*	lb.	.46	.48
Stabilizer No. 1*	lb.	1.55	1.80
Stabilizer No. 9-A*	lb.	.80	1.05
Styphen I*	lb.	.51	.55
Sunolite*	lb.	.16	.22
Tecquinol*	lb.	.82½	.84½
Tenamene 3*	lb.	.57	.60
Thermoflex A*	lb.	1.05	1.07
Wing-Stay S*; T*	lb.	.56	.67
Zalba*	lb.	——	1.10
Special*	lb.	——	.85

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NC-1012*	lb.	.46	.69
Santoflex AW*	lb.	.71	.78
UOP 88* & 288* (dms.)	lb.	1.05	1.07
Wing-Stay 100*	lb.	1.00	1.08

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Akron Benzoic Acid	lb.	.41	.43
Armeen HT*	lb.	.34	.40
Good-rite Vultrol*	lb.	.67	.70
Harcopol 1183*	lb.	.70	.74
Retarder PD*	lb.	.37	.39
W*	lb.	——	.46
Sodium Acetate 60-62% Crystals	lb.	.08	.08½

ANTISEPTICS AND GERMICIDES

A.P.C. 6901*	lb.	.32	.38
Arquad S*	lb.	.38	.44
Formaldehyde (dms.)	lb.	.06	.076
G-4* (bbls.)	lb.	1.09	1.29
G-11*	lb.	1.98	2.08
Halane*	lb.	.40	.47
Irgason BS200*	lb.	2.50	2.75
Ortho Cresol (26°—27°)	lb.	.15	.16
Preventol GD	lb.	——	1.09
Retarder D*	lb.	.42	.50

ANTI-WEBBING AGENTS (for Latex)

DC 7 Compound*	lb.	4.70	5.80
Webnix 34-L*	lb.	1.25	1.75
57*; 69C*	lb.	1.50	2.00
71*	lb.	1.25	1.75

AROMATICS (DEODORANTS)

Airkem 115*	gal.	——	6.50
122*; 186*	gal.	——	6.50
Alamask AA*	lb.	——	3.00
AF*	lb.	——	2.50
AO*	lb.	——	1.50
AR*	lb.	——	.50
BG*	lb.	——	1.15
BGM*	lb.	——	.60
CY*	lb.	——	2.40
DJ*	lb.	——	3.35
DL*	lb.	——	1.95
H*	lb.	——	5.50
LD*	lb.	——	.75
ND*	lb.	——	2.75
O*	lb.	——	6.50
OS*	lb.	——	5.25
Bouquet 149*	lb.	——	3.00
Coumarin*	lb.	——	3.70
Deodorant 65*	lb.	——	1.85
Deodorant L-37*	lb.	2.15	2.25
L-44*	lb.	2.65	2.75
N.L.T.X.*	lb.	1.90	2.00
Deodorant Oil GD 6422*	lb.	1.90	2.20
GD 6423*	lb.	1.60	1.90
GD 6575*	lb.	2.40	2.90
GD 31063*	lb.	2.25	2.75
Ethavan*	lb.	6.20	6.25
Latex Perfume 17326	lb.	——	4.00
18301	lb.	——	3.00
22258	lb.	——	2.50
Naugaromes* (dms.)	lb.	.60	3.00
Neutroleum Delta*	lb.	——	2.25
Gamma*	lb.	——	3.25
Parador A*	lb.	1.80	2.10
C*	lb.	2.00	2.50
E*	lb.	.25	.40
GD 5280*	lb.	2.00	2.50
GD 53481*	lb.	1.70	2.00
Perfume Oil Bouquet Vanilla M*	lb.	1.60	1.70
Rodo No. 0*	lb.	4.00	4.50
No. 10*	lb.	5.00	5.50
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Russian Leather 7*	lb.	——	4.35
Vanillin	lb.	2.75	2.80

BLOWING AGENTS

Ammonium Bicarbonate	cwt.	——	9.00
Better Blend Soda* (c.l., bags)	cwt.	——	2.70
B-I-K	lb.	.20	.22
Blowing Agent No. 81105*	lb.	.32	.35
Celogen*	lb.	——	1.95
AZ*	lb.	1.92	1.94
80	lb.	——	1.60
Diazo Amino Benzene	lb.	——	.75
Kempore R-125	lb.	——	1.92
Neo Fat 42-12*	lb.	.10¾	.12¾
Opex 40	lb.	——	.72
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Unicel ND*	lb.	——	.72
S*	lb.	——	.20
Urea	lb.	.06	.07

BONDING AGENTS

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Braze*	gal.	6.00	9.00
Braze Cover Cement*	gal.	2.50	4.00
Chemlock 201, 203	gal.	5.00	7.50
220	gal.	8.95	12.00
401	gal.	5.00	24.00
607	gal.	18.00	24.00
614	lb.	4.35	4.75

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EX-B501-4	gal.	6.20	4.90
EX-B150-1	gal.	8.15	11.00
EX-B579-1	gal.	19.40	26.40
Gen-Tac Latex*	lb.	.70	.75
Hylene M*	lb.	1.25	1.50
M-50*	lb.	.86	1.11
Penacolite B1A*	lb.	——	.95
R-2710*	lb.	——	.95
Pliobond 20*	gal.	2.91	4.23
30*	gal.	3.65	4.97
Rex Compounds*	gal.	1.30	1.90
Thixons*	gal.	2.95	9.80
Ty-Ply Q (BN & S)*	gal.	6.75	8.00
Tygobond 30*	gal.	4.10	5.40
40*	gal.	5.80	6.89
41*	gal.	8.65	9.85
45*	gal.	5.75	6.48
Vinculux	gal.	——	4.95

COAGULANTS

Acetic Acid—56% (bbls.)	cwt.	9.00	11.00
Glacial 99½% (dms.)	lb.	.12	.13
Calcium Nitrate, Tech. Flake	lb.	.07½	.09½
Hydroxyacetic Acid—70% (dms.)	lb.	——	.09½
Zinc Nitrate, Tech. Flake	lb.	——	.20

COLORING AGENTS

Black

Aquablak B*	lb.	.09¾	.10¾
M*	lb.	.10½	.11
S*	lb.	.11¼	.12¼
Black Shield 4*	lb.	.10	.10½
No. 6	lb.	.11	.11½
No. 17	lb.	.12½	.13
No. 19	lb.	.12	.12½
Carbon Black—See *Reinforcing Agents*			
Lampblack No. 10*	lb.	.06	.09
Mapico Black Iron Oxide* (50 lb. bags)	lb.	.14¾	.15
Pure Black Iron Oxide	lb.	.14¾	.15

Blue

Akron Masterbatches*	lb.	2.23	2.78
Toners*	lb.	2.30	6.35
Blue Powders	lb.	2.20	3.75
Cooke M.B. Blue* 426	lb.	2.20	3.75
Cyan Blue GT 55-3295	lb.	——	3.20
XR 55-3760	lb.	——	2.90
XR 55-3770	lb.	——	3.25
Disco Blues	lb.	2.20	3.45
Harmon Blue Toner B-4776	lb.	——	2.90
Monastral Rubber Blue CPL*	lb.	1.95	1.95
PCD. Dispersed*	lb.	——	2.55
Peacoline Blue*	lb.	——	3.85
Ramapo Blue*	lb.	2.75	3.00
Rubber Blue GD* (Disp.)	lb.	——	4.75
Rubber Blue X-1999*	lb.	——	1.90
Rubber Dispersed Blues	lb.	2.52	2.78
Solfast Blue*	lb.	1.60	3.25
Stan-Tone MBS*	lb.	2.20	2.92
GPE*	lb.	2.25	2.75
PEC*	lb.	1.95	2.10
Ultramarine	lb.	.14	.30
Vansul Blue M.B.*	lb.	1.00	2.70

Brown

Brown Iron Oxide	lb.	.15¾	.16
Mapico Brown* (50 lb. bags)	lb.	.15¾	.16
Stan-Tone GPE*	lb.	——	3.00
Vansul Brown M.B.* (Organic)	lb.	——	2.30

Green

Akron Masterbatches*	lb.	1.53	3.08
Toners*	lb.	1.50	4.35
Chromium Oxide	lb.	.44½	.45¼
Cooke M.B. Green*	lb.	1.60	2.80
413*	lb.	——	2.80
Cyan Green 15-3100	lb.	——	3.35
Disco Greens	lb.	1.55	2.80
Green Powders	lb.	1.35	3.95
Harmon Green Toner G-5056	lb.	——	3.95
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Pigment Green B*	lb.	1.45	1.50
GL-652D*	lb.	.90	.95
Ramapo Green*	lb.	——	3.50
Rubber Dispersed Greens	lb.	1.23	3.08
Rubber Green FD* (Disp.)	lb.	——	2.05
Rubber Green X-1292*	lb.	——	1.75
Serene Green*	lb.	——	3.50
Solfast Green*	lb.	1.60	3.35
Stan-Tone MBS*	lb.	2.50	3.42
GPE*	lb.	1.50	1.70
PC*	lb.	2.20	2.25
Vansul Green M.B.*	lb.	1.50	2.75

Maroon

Akron Masterbatches*	lb.	3.53	4.38
Toners*	lb.	.98	5.60
Harmon Maroon Toner MV-6606	lb.	——	5.75
Pyrolux Maroon*	lb.	——	3.40
Vansul Maroon M.B.*	lb.	——	4.05

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COLORING AGENTS (Cont'd)

Orange

Akron Masterbatches*	lb.	2.53	2.98
Toners*	lb.	2.97	4.30
Benzidene Orange	lb.	—	3.30
Cooke MB*	lb.	2.25	2.35
425*	lb.	—	2.25
Dianisidine Orange*	lb.	—	2.85
Disco Oranges	lb.	2.30	2.85
Harmon Diane Orange Toner Y-25	lb.	—	2.85
Pyrazolone Orange Toner YB-3	lb.	—	3.30
Hi-Fiz Fluorescent	lb.	1.40	2.40
Mercadium X-2667*	lb.	—	1.70
Molybdate Orange	lb.	—	.49
Oswego Orange X-2065*	lb.	—	3.30
Rubber Orange OD* (Disp.)	lb.	—	2.45
Stan-Tone Cadmium Dry*	lb.	1.85	4.28
Cadmium Paste*	lb.	2.43	2.85
GPE*	lb.	1.05	1.20
PC*	lb.	.75	.80
Vansul Orange M.B.*	lb.	2.30	2.65

Red

Akron Masterbatches*	lb.	1.30	3.68
Toners*	lb.	.98	5.60
Arcturus Reds*	lb.	—	1.35
Antimony Trisulfide	lb.	.72	.78
R.M.P. Sulfur Free*	lb.	—	.78
R.M.P. No. 3*	lb.	—	.72
Bonadur 20-6440	lb.	—	1.90
20-6540	lb.	—	2.00
Brilliant Toning Reds*	lb.	1.77	1.90
Cadmolith Red* (dms.)	lb.	1.94	2.87
Clarion 20-7150	lb.	—	1.35
Cooke M.B. Red*	lb.	1.05	3.25
410*	lb.	—	1.75
Disco Reds	lb.	1.05	3.25
Graphic Red* (dlvd.)	lb.	.98	1.03
Harmon Electra Red Toner	lb.	—	3.45
Lithol Rubine Toner R-6142	lb.	—	1.60
Pyrazolone Red Toner	lb.	—	1.40
Rincon Red Tones	lb.	—	1.90
Hi-Fiz Fluorescent	lb.	1.15	2.15
Kroma Reds*	lb.	.14¼	.14½
Lake Red C*	lb.	—	1.25
Mapico Reds* (50 lb. bags)	lb.	.14¼	.14½
Mercadium X-2668 Light*	lb.	—	1.77
X-2669 Medium Light*	lb.	—	1.85
X-2670 Medium*	lb.	—	1.92
X-2671 Dark*	lb.	—	2.00
Naphthol 20-7575	lb.	—	3.80
Oximony Red Iron Oxide	lb.	.14¼	.14½
Plasticone Red*	lb.	1.02	4.60
Polaris Red*	lb.	—	1.70
Recco Red Oxide*	lb.	.13½	.13¾
Red Iron Oxide, Light	lb.	.14¼	.14½
Red Powders	lb	—	4.40
Rubber Dispersed Reds	lb.	1.47	3.58
Rubber Red PBD* (Disp.)	lb.	—	2.05
2BD, Dispersed*	lb.	—	2.00
2BL*	lb.	1.24	1.24
PBL*	lb.	1.24	1.24
Rubanox Reds*	lb.	1.47	1.60
Rubber Red CP-339* (dlvd.)	lb.	—	1.10
Rubber Red X-1148*	lb.	—	.98
Solfast Red*	lb.	1.47	1.80
Stan-Tone MBS*	lb.	1.00	3.75
GPE*	lb.	.70	3.05
PC*	lb.	1.10	1.45
Vansul Red M.B.*	lb.	1.00	3.35
Watchung Red*	lb.	1.90	1.90

Tan

Mapico Tan 15* (50 lb. bags)	lb.	.23¼	.23½
20* (50 lb. bags)	lb.	.23¼	.23½

White—Lithopone

Permolith*	lb.	.0825	.09125
Sunolith*	lb.	.0800	.0875

White—Titanium Pigments

Iceberg*	lb.	—	.0265
Icecap K*	lb.	—	.03¼
Horse Head Anatase Grades*	lb.	.25½	.26½
Rutile Grades*	lb.	.27½	.28½
Stan-Tone PC*	lb.	.55	.60
Ti-Cal*	lb.	.09	.09¾
R-22*, R-25*, R-27*, R-30*	lb.	.09¾	.09⅞
R-60*	lb.	.09⅞	.10⅛
Ti-Pure*	lb.	.24½	.27½
Anatase Grades*	lb.	.25½	.26½
R-100*, R-500*	lb.	.27⅛	.28½
Titanox A*—all grades (dlvd.)	lb.	.25½	.26½
C-50* (dlvd.)	lb.	.14¾	.14⅞
RA* (dlvd.)	lb.	.27½	.28½
RA-10* (dlvd.)	lb.	.27½	.28½
RA-NC* (dlvd.)	lb.	.27½	.28½
RC* (dlvd.)	lb.	.09¾	.10⅛
RC-HT* (dlvd.)	lb.	.09¾	.09⅞

COLORING AGENTS (Cont'd)

White—Titanium Pigments (Cont'd)

Unitane O-110*	lb.	.25½	.26½
O-220*	lb.	.25½	.26½
O-310*	lb.	.25½	.26½
OR-150*	lb.	.27½	.28½
OR-250*	lb.	.27½	.28½
OR-340*	lb.	.27½	.28½
OR-342*	lb.	.27½	.28½
OR-350*	lb.	.27½	.28½
OR-540*	lb.	.27½	.28½
OR-640*	lb.	.27½	.28½
Zopaque*	lb.	.24½	.25½
R*	lb.	.26½	.27½

White—Zinc Oxide (American Process)

AZODOX 44, 45	lb.	.1250	.1350
AZO-ZZZ 11*, 22*, 33*, 44* 55*	lb.	.1250	.1350
Eagle-Picher AAA*	lb.	.1450	.1550
Horse Head Special*	lb.	.1450	.1550
XX*	lb.	.1450	.1550
Protox 166*	lb.	.1450	.1550
167*	lb.	.1450	.1550
267* (pelleted)	lb.	.1450	.1550
St. Joe Black Label* 20, 20-21	lb.	.1450	.1550
Red Label* 30, 31	lb.	.1450	.1550
Green Label* 12, 46 (latex only)	lb.	.1450	.1550
Green Label* 42, 42-21, 42A-3, 43 Pelets	lb.	.1450	.1550

White—Zinc Oxide (Dispersed)

Dispersed Zinc Oxide	lb.	—	.13

White—Zinc Oxide (French Process)

AZO-ZZZ 66	lb.	.1250	.1350
Florence Green Seal*	lb.	.1450	.1550
Red Seal*	lb.	.1450	.1550
White Seal*	lb.	.1475	.1575
Kadox 25*	lb.	.1350	.1450
15*, 17*, 72* & 515	lb.	.1300	.1400
Protox 168*	lb.	.1450	.1550
169*	lb.	.1450	.1550
268* (pelleted)	lb.	.1450	.1550
U.S.P. (cartons)	lb.	.1600	.1700
XX-78*	lb.	.1450	.1550

White—Zinc Sulfide

Cryptone ZS*	lb.	.2530	.2630
Lehigh 12%*	lb.	.1250	.1350
18%*	lb.	.1400	.1500
35%*	lb.	.15375	.16375
50%*	lb.	.1575	.1675

Yellow

Akron Masterbatch*	lb.	1.27	2.48
Toners*	lb.	2.20	6.00
Benzidene-Lightfast	lb.	3.40	5.35
Benzidine Yellow	lb.	1.41	2.55
Cadmolith Yellow (dms.)	lb.	—	1.19
Chrome Yellow	lb.	.35	.35
Cooke M.B. Yellow 405*	lb.	2.15	2.75
Disco Yellows	lb.	2.05	3.95
Harmon Benzidene Yellow Toner YB-2	lb.	—	2.25
Fanchon Yellow Toner	lb.	—	2.20
Hi-Fiz Fluorescent	lb.	1.60	2.60
Iron Oxide, Pure Light Shades	lb.	.12½	.12¾
Dark Shades	lb.	.12	.12¼
Mapico Yellow* (50 lb. bags)	lb.	.12	.12¼
Rubber Dispersed Yellows	lb.	1.27	2.13
Rubber Yellow GD* (disp.)	lb.	—	2.25
GL*	lb.	—	1.68
Rubber Yellow X-1940*	lb.	—	2.55
Stan-Tone Cadmium Dry*	lb.	2.80	3.03
Cadmium Paste	lb.	1.72	1.82
MBS*	lb.	1.30	2.20
GPE*	lb.	.70	3.25
PC*	lb.	.55	3.50
Toluidine Yellow	lb.	2.20	2.20
YL-660 D*	lb.	1.25	1.35
Oximony Iron Oxide	lb.	.14¼	.14½
Vansul Yellow M.B.*	lb.	1.15	2.15
Yellow Powders	lb.	2.00	5.00
Zinc Yellow	lb.	.29	.29

DISPERSING AGENTS

Anchoid*(†)	lb.	.24	.25
Anhydrapent*	lb.	.56	.59
Armeen 18*	lb.	.39	.45
Belloid TD*	lb.	.15¾	.16¼
Blancol*	lb.	—	.15¼
Darvan No. 1*	lb.	.25¼	.38¼
No. 2*; No. 3*	lb.	.23¾	.36¾
No. 6*	lb.	.18½	.19
No. 7*	lb.	.26¼	.36¼
Daxad 11* (21*, 23*)	lb.	.08	.30
Diethanolamine (dms., dlvd.)	lb.	.24½	.27
Dispersaid*	lb.	1.25	1.35
Emcol K-8300* (dms.)	lb.	.14	.18
P10-59	lb.	.32	—
5120	lb.	.31	—
5138	lb.	.31	—
Emulphor ON-870*	lb.	—	.55
Farala*	lb.	.06½	.07½
Halloid*	lb.	.04½	.05½
Igepal CO-630*	lb.	—	.29
Igepon T-73*	lb.	—	.29½
Kyro EO* (dms.)	lb.	—	.29¾
Leonil SA*	lb.	—	.55

DISPERSING AGENTS (Cont'd)

Lipal No. 9N*; 11-O*	lb.	.28	.29
Lomar PW*	lb.	.15¼	.15¾
Marasperse C*	lb.	.06¼	.06¾
CB*	lb.	.15	.17
N*	lb.	.09½	.10½
Monoethanolamine (dms., dlvd.)	lb.	.25	.27½
Naccosol A (dlvd.)	lb.	—	.52
Naccotan A*	lb.	.16½	.17
Nekal BA-75*	lb.	—	.40
BX-78*	lb.	—	.64
Nopcosant*	lb.	.15¼	.15¾
Pluronic F68*	lb.	.38½	.44
Polyfon*	lb.	.08	.10
R & R 551*	lb.	—	.28
Stablex B*	lb.	.50	.95
Stan-Chem BQC*	lb.	.12¼	.17¼
1067*	lb.	—	.13½
1471*	lb.	.1687	.2187
2251*	lb.	.12¼	.17¼
Trenamine D-25*	lb.	.32½	.36
Triethanolamine (dms., dlvd.)	lb.	.22	.25½
Yelkin TT* (and TTS*)	lb.	.13	.16

EXTENDERS

Arcco 1294-36B*	lb.	.11½	.12½
Car-Bel-Ex-A*	lb.	—	.144
Extender 600*	lb.	—	.1870
Facile Gum 4A*	lb.	.48	.50
Millex*; W*	lb.	—	.07
Nopco 2271*	lb.	.16¾	.18¾
OPD*	lb.	.29	.40
Polyco 418*	lb.	.17	.18
PR-162 Latex Extender*	lb.	—	.182
Solvitose HDF*	lb.	.22	.25
Synprolac*	lb.	.16	.23
Synprowax*	lb.	—	.23
Vanadiset B*	lb.	.0360	.07
C*	lb.	.0310	.06
MR* 80 mesh	lb.	.08½	.12½
Vistanex MM Grades*	lb.	—	.35
Wilcarbo Carbon Powders*	lb.	.08	.15

FILLERS (Inert and Reinforcing)

Abrasives			
Carbonite*	lb.	.21½	1.35
Lionite*	lb.	.16	1.27
Pumice	lb.	.03	.05
Walnut Shell Grits	ton	60.00	110.00
Aluminum Hydrate	lb.	.031	.170
Kaiser Aluminum Hydrate*	lb.	.035	.065
Aluminum Silicate			
AFD*	ton	29.50	36.00
Aluminum Flake*	ton	29.50	36.00
Marter White*	ton	18.50	30.00
Barium Carbonate (l.c.l.)	ton	109.00	126.50
Barytes			
No. 1 Floated, White*	ton	55.00	79.85
No. 2 Floated, Unbleached*	ton	50.00	74.85
No. 22 Barytes* (c.l.)	ton	—	30.00
No. 3805 Barytes*	ton	22.00	26.75
Foam A*	ton	60.00	84.85
Sparmite*	ton	80.00	90.00
XIOR*	ton	90.00	95.00
Bentonite (c.l.)	ton	—	13.50
Argosite Clay* (c.l.)	ton	—	12.50
Bennett Clay* (c.l.)	ton	—	32.50
SPV Volclay* (c.l.)	ton	—	13.50
White Hi-Gel*	ton	—	65.90
Blanc Fixe	ton	125.00	142.00
Calcium Carbonate			
Allied Whiting	ton	—	11.50
Atomite* (c.l.)	ton	32.50	35.00
B.I. White No. 1 (c.l.	ton	—	10.00
Calcene NC*	ton	80.00	100.00
TM*	ton	82.50	102.50
Calwhite*	ton	20.00	25.00
T*	ton	25.00	30.00
Camel-Carb*	ton	—	14.00
Camel-Tex*	ton	—	22.00
Camel-Wite*	ton	—	35.00
Carbium	ton	30.00	40.00
CCC "G"*	ton	15.00	17.00
CCC No. 1*	ton	10.50	12.50
CCO White*	ton	—	22.00
Duramite*	ton	20.00	22.00
Gamaco* (c.l.)	ton	32.50	37.50
T*	ton	37.50	42.50
GamaKal*	ton	37.50	42.50
Georgia Marble 5-25* (c.l.)	ton	—	20.00
No. 10 White* (c.l.)	ton	—	11.00
Kalite*	ton	52.50	67.50
Kalmac*	ton	23.00	28.00
Laminar*	ton	—	30.00
Lexamite* (c.l.)	ton	—	27.50
Lorite*	ton	30.00	36.00
Millical*	ton	38.00	53.00
Multifex MM*	ton	117.50	137.50
Non-Fer-Al*	ton	35.00	50.00
Purecal M*	ton	65.00	85.00
SC* (and T*)	ton	117.50	137.50
U*	ton	127.50	147.50
PPTD* (c.l.)	ton	—	30.00
Rambo No. 1*	ton	—	11.50
Snowflake*	ton	20.00	22.00
Super Multifex*	ton	167.50	187.50
Surfex*	ton	42.00	57.00
Suspenso*	ton	38.00	43.00
Witcarb Reg.*	ton	60.00	85.00
R*	ton	127.50	150.00
RC*	ton	117.50	140.00
York White*	ton	—	11.50

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CONTAINS:

2365 rubber compounds on individual punched cards, presorted first by polymer, then each polymer grouped into black and nonblack subgroups, further subdivided by hardness and then by tensile.

115	compounds	for natural rubber, black
154	"	for natural rubber, nonblack
276	"	for styrene rubber, black
150	"	for styrene rubber, nonblack
259	"	for nitrile rubber, black
97	"	for nitrile rubber, nonblack
254	"	for neoprene, black
116	"	for neoprene, nonblack
101	"	for butyl, black
57	"	for butyl, nonblack
50	"	for polysulfide, black and nonblack
36	"	for reclaim (all black compounds)
45	"	for Hypalon, black and nonblack
86	"	for silicone rubber, black and nonblack
92	"	for vinyls (all nonblack compounds)
100	"	for miscellaneous other rubbers, black and nonblack
156	"	for blends of gener purpose rubbers (natural, styrene, butyl, reclaim), black
71	"	for blends of general purpose rubbers, nonblack
77	"	for blends containing oil-resistant rubbers, black
73	"	for blends containing oil-resistant rubbers, nonblack
2365	compounds	Total

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NAME _____

COMPANY _____

ADDRESS _____

CITY—STATE _____

FILLERS (Cont'd)

Calcium Silicate			
Silene EF*	lb.	.06	.06½
Calcium Sulfate, Anhydrous			
Snow White Filler*	ton	—	22.00
Calcium Sulfate Hydrous			
Terra Alba No. 1*	ton	—	17.00
Chalk Whiting (l.c.l.)	lb.	.01½	.01¾
Recco Paris Whiting*	ton	—	35.00
OMYA Whiting*	ton	—	35.00
Clay			
Afton Clay*	ton	13.00	38.00
Aiken Clay*	ton	14.50	—
Akron HC-100*	ton	14.50	—
HC-75*	ton	13.00	—
SC-25*	ton	14.50	—
Alsilite* (c.l.)	ton	30.00	45.00
Aluminum Flake*	ton	25.50	28.50
Barden R*	ton	7.50	12.00
Buca* (c.l.)	ton	—	45.00
Burgess No. 20*	ton	—	33.00
No. 30*	ton	—	40.00
Burgess Iceberg*	ton	—	53.00
Icecap K*	ton	—	65.00
Catalpo* (c.l.)	ton	33.00	—
Champion*	ton	—	14.50
Crown*	ton	—	14.50
Dixie* (c.l.)	ton	—	14.50
Dover*	ton	—	13.00
Franklin Clay—R* (c.l.)	ton	16.00	41.50
G. K. Soft*	ton	11.50	32.00
Glomax HE (bags)	ton	65.00	—
LL (bags)	ton	53.00	—
PVR (bags)	ton	40.00	—
WZ (bags)	ton	45.00	—
Harwick Clays*	ton	21.50	77.00
Hydrite RS (bags)	ton	30.00	—
PXS (bags)	ton	45.00	—
UF (bags)	ton	100.00	—
10S (bags)	ton	50.00	—
Flat "D" (bags)	ton	25.00	—
Hi-White R*	ton	10.00	14.50
Kaolloid Clay* (c.l.)	ton	—	10.50
LGB*	ton	13.00	17.50
LGP*	ton	15.50	20.00
McNamee* (c.l.)	ton	—	14.50
Natka 1200	ton	12.00	35.00
Par* (c.l.)	ton	—	12.00
Paragon*	ton	10.00	14.50
Pigment 5*	ton	27.50	34.50
33*	ton	—	40.00
Polyfil 40	ton	40.00	—
70	ton	53.00	—
80	ton	65.00	—
C	ton	25.00	—
F	ton	45.00	—
X	ton	30.00	—
Recco* (c.l.)	ton	—	14.50
Swanee Clay*	ton	—	12.50
Snobrite*	ton	—	12.50
Suprex*	ton	10.00	14.50
Whitetex* (c.l.)	ton	53.00	—
Windsor*	ton	14.50	39.50
4200 Clay*	ton	13.00	—
Diatomaceous Earth	ton	30.00	50.00
Celatom MN-33	ton	36.00	95.00
MP-25	ton	55.00	121.00
MP-63	ton	55.00	121.00
Celite 270	ton	55.00	121.00
292	ton	36.00	95.00
315; 350	ton	137.00	225.00
Kaylorite* (c.l.)	ton	—	30.00
Lorite*	ton	—	36.00
Flock			
Cotton (White)	lb.	.28	.30
Colored	lb.	.12	.20
Filfloc F 40-9000*	lb.	—	.13
F 6000*	lb.	—	.36
Nylon	lb.	—	.35
Polycel*	ton	110.00	210.00
Rayon, Bleached or Dyed	lb.	.75	1.20
Rayon, Grey	lb.	—	.18
Rayon, Pink	lb.	—	.20
Solka-Floc* (l.c.l.)	lb.	.07	.16
Glue, Amber	lb.	.17	.19
Ground Softwood Bark			
Silvacon* (c.l.)	ton	55.00	100.00
Leather			
Flour (dust)	lb.	.12	.13
Shredded	lb.	.05	.17
Lignin	lb.	.06	.08
Limestone, Pulverized	ton	3.00	5.00
Asbestol Regular*	ton	28.00	—
Asbestol Superfine*	ton	33.00	—
Georgia Marble No. 10*	ton	—	11.00
Industrial Filler No. 100*	ton	—	7.75
Micro Velva A*	ton	53.00	—
L*	ton	61.00	—
No. 1 White*	ton	—	11.00
Magnesium Carbonate	lb.	.10½	.13
K & M Technical* (c.l., eqld.)	lb.	.10½	.12
Marinco CL*	lb.	.11	.13
Michigan*	lb.	.11	.15
Magnesium Silicate (see Talc)			
Mica	lb.	.01¼	.07½
Concord*	lb.	.08	.08¾
Micro-Mica*	lb.	.08	.08¾
Mineralite* (c.l.)	ton	40.00	85.00
Silversheen*	lb.	.08	.08¾
Triple A Mica* (c.l.)	ton	—	40.00
Vermiculite*	lb.	—	.11
Wet Ground Biotite Mica	lb.	.06½	.07¼
Wet Ground Mica No. 160*	lb.	.08	.08¾

FILLERS (Cont'd)

Pecan Shell Flour			
Stan Shell*	ton	45.00	75.00
Pyrophyllite			
No. 261*	ton	—	11.50
Pyrax A* (c.l.)	ton	14.50	15.00
WA* (c.l.)	ton	17.00	17.50
Sawdust, Graded	ton	14.00	35.00
Silica	ton	16.00	27.00
Extra Fine (bags) (c.l.)	ton	—	43.00
Slate, Powdered (l.c.l.)	ton	15.00	20.00
Lo-Micron Slate Flour*	lb.	—	.04½
No. 133 Slate Flour*	ton	—	4.55
Sodium Silico Aluminate			
Zeolex 23*	lb.	.06	.07
Talc (Magnesium Silicate)			
Akron Soapstone*	ton	—	9.75
Asbestol Regular*	ton	—	27.00
Eastern RC-500*	ton	—	32.00
No. 41*	ton	—	19.70
No. 549*	ton	—	63.00
French*	ton	—	59.00
No. 367*	ton	—	13.00
No. 1600*	ton	—	70.60
No. 1768*	ton	—	13.00
Nytal 200* (c.l.)	ton	—	28.00
300* (c.l.)	ton	—	38.00
Sierra Fibrene C-400*	ton	34.00	40.00
Sierra Supreme 325*	ton	51.00	56.00
Sierra White*	ton	21.75	26.75
Soapstone*	ton	—	13.00
Walnut Shell Flour	ton	55.00	100.00
Agrashell*	ton	55.00	115.00
Stan-Shell*	ton	50.00	110.00
Whiting, Commercial	ton	—	7.50
Allied Whiting*	ton	—	11.50
Camel-Carb*	ton	—	10.00
Calwhite (c.l.)	ton	—	20.00
C-C-O White*	ton	—	22.00
Georgia Marble No. 15*	ton	—	20.00
No. 10*	ton	—	20.00
Pigua No. 1 YAA* (c.l.)	ton	10.00	10.00
No. 2 LS* (c.l.)	ton	10.00	10.00
Snowflake* (c.l.)	ton	20.00	22.00
Stan-White 325*	ton	11.50	14.10
Ultrasil*	lb.	.35	.50
Veroc* (c.l.)	ton	—	11.50
Welco* (c.l.)	ton	—	10.50
York White R* (c.l.)	ton	—	11.00
Wood Flour	ton	31.50	48.00

FINISHING MATERIALS, SURFACE

Beaco Finishes*	gal.	2.10	2.35
Black Out*	gal.	4.50	8.00
Calcium Hypochlorite (dms.) (cwt.)	ton	33.30	37.90
Shellac, Orange Gum	lb.	.35	.45
VanWax*	gal.	2.00	2.05

FLAME RETARDANTS

Celluflex CEF* (dms.)	lb.	—	.65
Chlorowax 40*	lb.	.15	.17½
70*	lb.	.16	.18½
70*	lb.	.18½	.20
Halowax*	lb.	.36	.46
Zinc Borate 3167*	lb.	.1920	.2020
Zyrox Compounds*	lb.	.38	.95½

LATEX MODIFIERS

Crux*	lb.	.30	.65
Foamnix*	lb.	.60	1.50
Ludox	lb.	.15	.16¾
Nopco EB*	lb.	.16¾	.18¾
EB-1*	lb.	.16¾	.18¾
EB-5*	lb.	.19½	.21½
OPD-101*	lb.	.29	.40
Piccopale A-1 Emulsion	lb.	.086	.113
A-20	lb.	.089	.116
A-22	lb.	.097	.124
A-41; A-43	lb.	.0775	.0145
C-1	lb.	.091	.118
N-3	lb.	.100	.127
STAYB*	lb.	.25	.45
Syton 200	lb.	.15	.16¼
Ubatol U-2001* (t.c.)	lb.	.166	.187
U-2003* (t.c.)	lb.	.184	.208
U-2007* (t.c.)	lb.	.166	.187
U-3025* (c.l.)	lb.	.223	.235
U-3040* (c.l.)	lb.	.260	.272
U-3045* (c.l.)	lb.	.260	.272
U-3050* (c.l.)	lb.	.195	.207
Webnix*	lb.	1.25	2.00

LUBRICANTS, MOLD

Akro Gel*	lb.	—	.165
Alipal CO-433*	lb.	—	.20
CO-436*	lb.	—	.24
Aluminum Stearate Crown Brand*	lb.	.37	.42
Amine, Mixed Crude*	lb.	.19	.25
Aquadag*	lb.	3.50	4.00
Aquarex D*	lb.	—	.81
L*	lb.	—	.94
ME*	lb.	—	.82
MDL*	lb.	—	.33
WAQ*	lb.	—	.22
Armeen HT*	lb.	.34	.40
18D*	lb.	.52	.56
Armid HT (flaked)*	lb.	.42	.46
0*	lb.	.39	.41
Borax Granular (l.c.l.)	ton	89.00	94.00

LUBRICANTS, MOLD (Cont'd)

Carbowax 4000*	lb.	.31	.32
CD Mold Release B*	gal.	5.00	—
B-2*	gal.	5.00	—
Colite Concentrate* (dms.)	gal.	.90	1.15
Colite D43D*	gal.	1.15	1.40
Concentrex*	lb.	—	.25
Dag Dispersion No. 197*	lb.	1.95	2.90
D.C. 7 Compound*	lb.	4.70	5.80
D.C. Emulsion No. 7*	lb.	1.59	2.07
No. 8*	lb.	1.15	1.69
No. 35*; 35A*	lb.	1.15	1.69
No. 35B*	lb.	1.15	1.69
No. 36*	lb.	1.15	1.69
D.C. Mold Release Fluid*	lb.	2.90	3.47
Dri-Lube*	lb.	—	.22
Dry-Flo* (50 lb. bags)	lb.	21.40	—
Emulsion Lubricant A80*	lb.	—	1.20
45*	lb.	—	1.20
G-E Silicone Emulsion SM-55*	lb.	1.15	1.69
SM-61*	lb.	1.15	1.69
SM-62*	lb.	1.15	1.69
G-E Silicone Fluid SF-92*	lb.	2.90	4.05
SF-96*	lb.	2.90	4.05
Hawkeye Flake* (dlvd.)	lb.	.11½	.13¼
Igepal CO-430*	lb.	—	.29
CO-630*	lb.	—	.29
CO-530*	lb.	—	.29
Igepon AP-78*	lb.	—	.48
T-33*	lb.	—	.21
T-51*	lb.	—	.13½
Kokobace R*	lb.	.17½	.18½
Lipal 9-N*	lb.	.28	.29
7-O*	lb.	.29	.30
Lubrex	lb.	.25	.30
Lubri-Flo*	gal.	10.00	12.00
Migralube*	lb.	—	.35
ML-1027-2C*	gal.	—	2.65
ML-1028-2C*	gal.	—	2.65
Mold Lubricant No. 72 Conc.* (dms.)	gal.	—	1.90
Mold Lubricant No. 426* (d.ms.)	lb.	.18	.17
No. 735* (dms)	gal.	—	1.25
No. 769* (dms.)	gal.	—	1.20
No. 825* (dms.)	gal.	—	2.00
No. 856* (dms.)	gal.	—	1.90
No. 880* (dms.)	gal.	—	1.19
No. 887* (dms.)	gal.	—	1.80
No. 935* (dms.)	gal.	—	1.56
No. 956* (dms.)	gal.	—	2.50
No. 965* (dms.)	gal.	—	2.15
No. 967* (dms.)	gal.	—	2.40
No. 969* (dms.)	gal.	—	1.50
No. 970* (dms.)	gal.	—	4.50
No 975* (dms.)	gal.	—	2.85
No. 980* (dms.)	gal.	—	1.53
No. 987* (dms.)	gal.	—	2.45
A 187* (dms.)	gal.	—	1.90
A 256* (dms.)	gal.	—	1.20
A 988* (dms.)	gal.	—	2.60
Moldeze No. 3*	gal.	—	4.95
Mold-Brite*	gal.	—	1.50
Monopole Oil MD*	lb.	—	.16
MR-22 Silicone Semi-Permanent	gal.	9.95	14.95
Olate Flakes*	lb.	.23½	.24¼
Orvus WA Paste* (dms.)	lb.	—	.23¼
Plaskon Polyethylene S*	lb.	.32	.47
Poly-Brite PE-20	lb.	.28	.42
600	lb.	.42	.58
Poly-Cone 125X	lb.	1.15	1.30
1,000	lb.	.91	1.04
Polyglycol 15-200*	lb.	.25	.28¼
E4000*	lb.	.31	.37
Prodag*	lb.	.32	.60
Purity Flake* (dlvd.)	lb.	.14¾	.16½
Rubber-Flo*	gal.	1.25	2.00
Rubber-Glo*	gal.	—	.94
Rusco Mold Paste*	lb.	.25½	.32
Sericite* (l.c.l.)	ton	65.00	75.00
Silicone Oil A145*	lb.	3.22	3.61
A220* (dms.)	lb.	—	2.80
Silrex (dms.)	lb.	—	.65
Rubars*	lb.	—	.22¾
Soybean Lecithin	lb.	.13	.17
Thermalube*	lb.	—	.13¾
UC Silicone L-45*	lb.	2.90	4.61
L-522*	lb.	2.68	3.50
LE-45*	lb.	1.15	1.69
LE-450*	lb.	1.15	1.69
Ucon Lubricants*	lb.	.26¾	.27¾
Ulco Mold Soap*	lb.	.19	.29

LUBRICANTS, RUBBER

Cyclolube NN-1; NN-2; NN-3	gal.	.12½	.20½
NN-4	gal.	.13½	.21½
114	gal.	.19	.27
4053	gal.	.21	.29
Diglycol Stearate Neutral (and SE) (dms.)	lb.	—	.25
Extrud-o-Lube*	gal.	1.33	1.54
Ivory Chips*	lb.	.19¾	.20¾
LatexLube GR* (dlvd.)	lb.	.19¼	.21½
No. 82-A* (450 lb. dms.)	lb.	—	.08½
Nopcowax 22-DS*	lb.	.38½	.41
Propylene Stearate (dms.)	lb.	.35	.60
Versa-Lube B*	lb.	.16	.18

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II. Techniques
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G-E Silicone Fluid SF-92*	lb.	3.04	4.25
Glycerized Lubricant*	gal.	1.25	1.48
Glydag B*	lb.	1.60	2.25
Glyso-Lube* (dms.)	lb.	—	.14
No. 3* (dms.)	lb.	—	.14
Hydro-Zinc*	lb.	—	.20
Latex-Lube Pigmented* (dlvd.)	lb.	.17¼	.19¼
P-66*	lb.	—	.17¼
Liqui-Lube* (dlvd.)	lb.	—	.17¾
N.F.* (dlvd.)	lb.	—	.17¾
N.T.* (dlvd.)	lb.	—	.16¾
Lubrex*	lb.	.27	.32
Lubri-Cote	gal.	.86	1.00
Magnesium Stearate	lb.	.42	.47
Crown Brand*	lb.	.40	.45
Polyethylene Glycol	lb.	.22	.26
Rexanol*	lb.	—	.13
Rubber Free (Concentrate)*	gal.	—	1.44
Jel*	lb.	.18	.21½
Separex*	lb.	.08½	.10½
Slab-Dip* (dms.)	lb.	—	.17
Soybean Lecithin	lb.	.13	.17
Stock-Lube*	lb.	—	.19
UC L-45*	lb.	2.90	4.61
L-522*	lb.	2.68	3.50
LE-450*	lb.	1.15	1.69
XL-42*	lb.	3.10	4.75
XLE-42*	lb.	1.22	1.70
XLE-420*	lb.	1.18	1.70
Wet Zinc*	lb.	—	.22¼
CW*, P*	lb.	—	.20
Zinc Stearate	lb.	.41	.46

MOLD CLEANERS

Actusol* (dlvd.)	gal.	1.45	1.65
Alkon* (dlvd.)	lb.	.16	.16½
CA-301*	gal.	—	2.49
CA-302*	gal.	—	2.63
G-O 6910*	lb.	.38	.40
Metso Anhydrous*	cwt.	5.70	7.95
Metso 99*	cwt.	5.00	7.25
200*	cwt.	6.70	8.95
Granular*	cwt.	4.45	6.70
Orvus Extra Granules*	lb.	.23¼	.24¾
Polo*	lb.	.12¾	—
Rubber-Sol*	gal.	2.97	3.97
Shelblast*	lb.	.04	.08¼
Sprex A.C.* (dlvd.)	lb.	.17¾	.18¾
Zip Mold Cleaner*	gal.	1.05	1.55

PEPTIZING AGENTS

Peptizer P-12*	lb.	.95	1.25
Pepton 22 Plasticizer*	lb.	.83	.86
65*	lb.	1.23	1.26
65B*	lb.	.83	.86
Pitt-Consol 640 (dms.)	lb.	—	.42
RPA 2*	lb.	—	.85
3*	lb.	—	.51
3 Conc.*	lb.	—	.85
6*	lb.	—	1.66

PLASTICIZERS & SOFTENERS

Actisil	lb.	.26	.27
Acto 500*	lb.	—	.09
Adipol BCA*	lb.	.47	.47½
2EH*	lb.	.42½	.44
10A*	lb.	.42½	.44
ODY*	lb.	.42½	.44
810*	lb.	.42½	.45½
XX*	lb.	.42½	.44
Admex 562 (dms.)	lb.	.50¾	.51¾
710 (dms.)	lb.	.35¾	.36¼
711 (dms.)	lb.	.37¾	.38¼
744 & 745 (dms.)	lb.	.41¾	.42¼
760 (dms.)	lb.	.59¾	.60¼
761 (dms.)	lb.	.46¾	.47¼
770 (dms.)	lb.	.42¼	.43
Anhydrol 6990*	lb.	.51	.56
Arneel SD*	lb.	.34	.40
Arolene 1980* (c.l.)	lb.	—	.10
Aromatic Plasticizer 10* (and 25*) (dms.)	lb.	.08	.08½
Aromatic Tar	gal.	.0573	.1973
Bardol*	lb.	.02¾	.03¼
B*	lb.	.06¼	.06½
Bayol D*	gal.	—	.382
F*	gal.	—	.52
Bearflex 1751*	lb.	.14	.15
LPO*	lb.	.03	.04
MPO*	lb.	.03¾	.04¾
Beeswax, Bleached	lb.	73	.75
Yellow Refined	lb.	.64	.65
Bondogen*	lb.	.55½	.60¼
B.R.C. No. 20*	lb.	.0150	.0175
No. 21*	lb.	.02¾	.03
No. 22*	lb.	.02½	.02¾
B.R.H. 2*	lb.	.0213	.0351
BRS 700*	lb.	.0200	.0285
B.R.T. 3*	lb.	.0180	.0265
4*	lb.	.0250	.0260
7*	lb.	.0300	.0310

PLASTICIZERS & SOFTENERS (Cont'd)

B.R.V.*	lb.	.0475	.0565
Bunarex Resins*	lb.	.07	.08
Bunatak AH*	lb.	—	.09½
N*	lb.	—	.31
U*	lb.	—	.17½
No. 90*	lb.	—	.09
No. 210*	lb.	—	.14
Butac*	lb.	.1735	.1835
Butyl Carbitol Perlargonate (dms.)	lb.	—	.64½
Butyl Cellosolve Perlargonate (dms.)	lb.	—	.68
Butyl Oleate	lb.	.26	.27
Butyl Palmitate	lb.	—	.26½
Butyl Stearate (dms.)	lb.	.26	.27
Byerflux*	gal.	.24	.27
Califlux 510* (and 550*)	lb.	.02¾	.03¾
G.P.*	lb.	.01½	.02½
R-100*	lb.	.04¾	.05¾
LBL*	gal.	.17	.25
OSR*	lb.	.01¾	—
RC*	gal.	.13½	.21½
TT*	lb.	.0195	.0295
Candelilla Wax, Prime	lb.	.53	.64
Refined Light	lb.	.56	.60
Carbowax 4000* (dms.)	lb.	.68	.70
Cardolite NC-103*	lb.	.36	.59
Carnauba Wax, Crude	lb.	.73	.74
Flaked	lb.	.73	1.25
Refined, Technical	lb.	.73	.74
Refined, Pure	lb.	.82	.86
Yellow	lb.	1.10	1.15
Celluflex* (dms.)			
112* (t.c., dlvd.)	lb.	—	.32½
179-A* (t.c., dlvd.)	lb.	—	.32½
179-C* (t.c., dlvd.)	lb.	—	.32½
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Chlorowax 40*	lb.	.15	.17½
50*	lb.	.16	.18½
70*	lb.	.18½	.20
LV*	lb.	.17	.19½
CTLA Polymer*	gal.	.20	.36
Cumar Resins*	lb.	.07	.19
Cyclolube OSR*	gal.	.28	.36
Darex DBM*	lb.	.30½	.34
DBP*	lb.	.30	.33½
DOP*	lb.	.30½	.33½
DIOP*	lb.	.30½	.33½
D.B.M.*	lb.	.32	.34¾
Decylbutyl Phthalate	lb.	.27	.29½
Degras, Common	lb.	—	.14
Diallyl Phthalate	lb.	.51½	.52½
Dibenzyl Sebacate (dms.)	lb.	.93	.93½
Dibutoxyethyl Sebacate	lb.	—	.61½
Dibutyl Phthalate (dms.)	lb.	.31½	.33
Dibutyl Sebacate	lb.	.67½	.68
Dicapryl Adipate (dms.)	lb.	.41½	.42½
Dicapryl Phthalate (dms.)	lb.	.27½	.29
Dicapryl Sebacate	lb.	.58	.59½
Di-Carbitol Phthalate (dms.)	lb.	.50½	.51
Dicyclohexyl Phthalate	lb.	.45	.46½
Diethyl Phthalate (dms.)	lb.	.29¾	.31¼
Di-2-ethylhexyl Phthalate (dms.)	lb.	.29	.30½
Dihexyl Adipate (dms.)	lb.	.46½	.47½
Dihexyl Phthalate (dms.)	lb.	.32½	.33½
Dihexyl Sebacate (dms.)	lb.	.66	.66½
Diisobutyl Azelate	lb.	—	.47¼
Diisobutyl Phthalate	lb.	.30	.31½
Di-iso-octyl Adipate	lb.	.42½	.43½
Dimethyl Phthalate (dms.)	lb.	.29¾	.31¼
Dimethyl Sebacate (dms.)	lb.	1.30	1.30½
Dinonyl Adipate	lb.	.44½	.47½
Dinopol IDO*	lb.	.29½	.31
MOP*	lb.	.30½	.32
Dioctyl Adipate (dms.)	lb.	.42½	.43½
Dioctyl Phthalate (dms.)	lb.	.29	.30½
Dioctyl Sebacate (dms.)	lb.	.61¼	.62¼
D.I.O.P. (dms.)	lb.	.28½	.30
Dipolymer Oil	gal.	.33	.48
Dispersing Oil No. 10*	lb.	.06	.06¼
Dutrex* 1, 6, 7	gal.	.18	.23
6H	gal.	.13	—
15E	gal.	.11	.23
20, 25	lb.	.03	.06
33	gal.	.21	.33
DX-111	lb.	.13¼	.14¼
DX-111 NS	lb.	.14¼	.15¼
DX-40	lb.	.14¾	.15¾
Elastex 10-P*	lb.	.30½	.33½
50-B*	lb.	.25	.28
DCHP*	lb.	.59	.60
Emulphor EL-719*	lb.	—	.58
Epoxy Plasticizer	lb.	.33½	.36
Drapex 3.2*	lb.	.39¼	.40¼
Drapex 4.4*	lb.	.34¾	.35¾
Drapex 7.7*	lb.	.37	.38
Esparto Wax	lb.	—	.55
Estac*	lb.	—	.16
Facile Gum 4A*	lb.	.48	.50
Flexol B-400*	lb.	.29	.30
DOP*	lb.	.29	.30½
TOF*	lb.	.47	.48
3GH*	lb.	—	.46¾
3GO*	lb.	—	.55¾
4GO*	lb.	—	.36½
426*	lb.	.28½	.30
Flexricin P-1*	lb.	.33½	.36½
P-4*	lb.	.30½	.33¼
P-6*	lb.	.37	.40
P-8*	lb.	.30¼	.33¼

PLASTICIZERS & SOFTENERS (Cont'd)

Fortex A* (dms.)	lb.	.12½	.14½
Fura-Tone NC-1008*	lb.	.28	.39
Galex W-100*	lb.	.15½	.19¾
Good-rite GP233*	lb.	.40	.43½
GP235*; GP236*	lb.	.40	.43½
GP261*	lb.	.28	.31½
GP265*	lb.	.28½	.32
GP266*	lb.	.29	.32½
GP-266-BPA*	lb.	.29	.32½
Hallco C-255-NS*	gal.	.27½	.29½
C-566*	lb.	.11	.13
Harflex 300* (dms.)	lb.	.60½	.61
325* (dms.)	lb.	.45	.45½
330* (dms.)	lb.	.46¾	.46¾
375* (dms.)	lb.	.76	.76½
HB20*	lb.	.17	.18½
HB40*	lb.	.21½	.23
Herron-H.T.*	gal.	.16	.27
Herron-Plas*	lb.	—	.03¾
Herron-Wax*	lb.	.05¼	.06
No. 23*	lb.	.08¼	.08¾
No. 24*	lb.	.07¼	.07¾
HSC No. 13*	lb.	.25	.32
No. 39*	lb.	.22	.29
Indonex W-2*	gal.	.12	—
Isooctyl Decyl Phthalate (dms.)	lb.	.28	.29½
K-stay*	lb.	.12	.13
Kapsol*	lb.	.35	.35½
Kenflex A & N*	lb.	.19	.34
Kesscoflex BCL* (dms.)	lb.	—	.37
BCO* (dms.)	lb.	—	.33
BCP* (dms.)	lb.	—	.36
BCS* (dms.)	lb.	—	.32
BO* (dms.)	lb.	—	.28¼
BS* (dms.)	lb.	—	.27½
DBT* (dms.)	lb.	—	.68
DIOA* (dms.)	lb.	—	.43½
DOA* (dms.)	lb.	—	.43½
MCO* (dms.)	lb.	—	.35½
MCP* (dms.)	lb.	—	.41
MCS* (dms.)	lb.	—	.35
TRA* (dms.)	lb	—	.40
KP 20*	lb.	.28½	.30
23*	lb.	.32½	.33½
90*	lb.	.42½	.44
140*	lb.	.48	.48½
201*	lb.	.46½	.48
260*	lb.	.36½	.38
Kremol 40*	gal.	.36	.46
50*	gal.	.39	.49
Kronisol* (dms.)	lb.	.38	.39
Kronitex AA* (dms.)	lb.	.35	.36
I, K-3, MX*	lb.	.35	.36
Lanolin, Tech. Anhydrous	lb.	—	.26
Latex-Lube G.R.*	lb.	.19¼	.20
Lead Oleate	lb.	—	.29¾
Lindol* (dms., t.c.)	lb.	—	.32½
Locusol No. 1-6980*	lb.	.30	.34
2-Mercaptoethanol (dms.)	lb.	1.25	1.50
Methox*	lb.	.42	.43
Methyl Laurate	lb.	.25	.27
Methyl Oleate	lb.	—	.20
Methyl Stearate (dms.)	lb.	—	.30
Monoplex DOS*	lb.	.59½	.60½
DBS*	lb.	.65½	.66½
S-70*	lb.	.41	.42
S-71*	lb.	.46½	.47½
Montan Wax, Crude	lb.	.21	.26
Flaked	lb.	.29	.29
Morflex*	lb.	.32	.69¼
Natac*	lb.	.1685	.1785
Nebony Resins* (dms.)	lb.	.04½	.05½
Neolene 210* (t.c.)	lb.	—	.16
212* (t.c.)	lb.	—	.14
220* (t.c.)	lb.	—	.15
Nerium*	lb.	—	.09
Nevillac Resins* (dms.)	lb.	.31	.85
Neville LX-880* (dms.)	lb.	.12	.13¼
LX-685* (dms.)	lb.	.12	.17½
LX-782 (dms.)	lb.	.07½	.08½
LX-828* (dms.)	lb.	.11	.12½
LX-1000* (dms.)	lb.	.12	.13
Neville Resins* (dms.)	lb.	.07¼	.20
Nevindene Resins* (dms.)	lb.	.16½	.20
Nevinol* (dms.)	lb.	—	.24
No. 480 Oil Proof Resin*	lb.	—	.18
Ohopex Q10* (dms.)	lb.	.30½	.32
R9* (dms.)	lb.	.37¼	.37¾
OPD*	lb.	.29	.40
Ortho-Nitrobiphenyl	lb.	.13	.15
Ozokerite Wax, White and Yellow	lb.	.24	.31
Panaflex BN-1*	lb.	.18	.22¼
Panarez 3-210	lb.	.12½	.14
6-210	lb.	.12	.13½
12-210	lb.	.11½	.13
Paradene Resins (dms.)	lb.	.07¼	.08
No. 2 Flaked	lb.	.08	.08½
Para Flux* (dms.)	gal.	.22	.25
2016* (dms.)	gal.	.22	.26
Para Lube* (t.c.l.)	lb.	.046	.048
Paraplex G-25*	lb.	.76	.77
G-40*	lb.	.50	.51
G-50*	lb.	.40¼	.41¾
G-53*	lb.	.45	.46
G-60* (and G-61*)	lb.	.32¼	.32¼
G-62*	lb.	.33¼	.33¼
Parmo*	lb.	.06	.13
Peroxidol 780*	lb.	.33¼	.36¼
781*	lb.	.34¼	.37¼
Petroflux MV*	gal.	.097	.177
Petrolatum (dms.)	lb.	.04¼	.14¾

high tinctorial strength / excellent light fastness

a quality pigment to create quality products

PERMANENT VIOLET TONER 49-6001

The inherent properties of this high-quality pigment recommend it for profitable utilization in many industries—printing ink, paint, enamel, lacquer, plastics, paper, and rubber.

Excellent fastness to light, high tinting strength, nonbleeding characteristics in vehicles and solvents, suitable dielectric properties—some of the outstanding and dependable qualities of Permanent Violet Toner 49-6001.

To meet diverse industrial requirements, Permanent Violet Toner 49-6001 is also supplied as—

Lake 49-6002
Presscake 49-6003
A Supra Paste 49-6016 (anionic)
N Paste 49-6027 (nonionic)
D 49-6034 (DOP)
M 49-6054 (medium soya alkyd)

For complete technical information, send for our new Pigment Catalog, GDC-352T.

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COLLWAY gaf

COLLWAY PIGMENTS

A DIVISION OF

GENERAL ANILINE & FILM CORPORATION

435 HUDSON STREET · NEW YORK 14, NEW YORK

CHARLOTTE • CHATTANOOGA • CHICAGO • LOS ANGELES • NEW YORK • PHILADELPHIA • PORTLAND, ORE. • PROVIDENCE • SAN FRANCISCO • IN CANADA: CHEMICAL DEVELOPMENTS OF CANADA, LTD., MONTREAL

PERMANENT VIOLET TONER, MANUFACTURED BY GENERAL ANILINE & FILM CORPORATION, IS SOLD OUTSIDE THE UNITED STATES AND CANADA UNDER THE TRADE NAME "FENALAC VIOLET TONER" BY DISTRIBUTORS ALL OVER THE WORLD.

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Why go on the warpath when contaminated solvent or late shipments slow down production? It doesn't help. And it's so much easier just to switch to Skellysolve. You'll find that Skellysolve is as pure as Pocahontas' kiss . . . and Skellysolve travels to you faster than an arrow from a brave's bow. Proof? Read this:

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SKELLYSOLVE-B. For making quick-setting cements for the shoe, tape, container, tire and other industries. Quick-drying, with no foreign taste or odor, in dried compound. Closed cup flash point about −25° F.

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SKELLY OIL COMPANY

Marketing Headquarters
Kansas City 41, Missouri

PLASTICIZERS & SOFTENERS (Cont'd)

PG-16*	lb.	——	.35
Philrich-5* (t.c.)	gal.	——	.12½
Picco 10* (and 25*)	lb.	.15	.15½
60* (and 75*)	lb.	.14½	.15
100*	lb.	.14½	.17
Piccocizer 30*	lb.	.06½	.07
Piccolastic A* (B*, C*, D* & E*)	lb.	.24	.25
FT* (FHX* & FX*)	lb.	.1695	.1745
T-135*	lb.	.19	.20
Piccolyte S Resins*	lb.	.20½	.23½
Piccopale Resins*	lb.	.1200	.1360
Piccoumaron Resins*	lb.	.07	.18
Pigmentar* Pigmentaroil*	lb.	.510	.684
Pitt-Consol 500* (dms.)	lb.	.30	.30½
Plastac M*	lb.	——	.09¼
Plasticil	lb.	.10½	.11¾
NS	lb.	.11½	.12¾
Plasticizer 2286*	lb.	——	.26¼
Plasticizer 4141*	lb.	.42½	.43½
Plasticizer DP-200, DP-250, DP-520*	lb.	.45	.45¾
DP-316*	lb.	.32¾	.33½
DP-317*	lb.	.46	.47¼
DP-8732*	lb.	.44¾	.46
Plasticizer LP*	lb.	——	.07
Plasticizer MP*	lb.	——	.08
Plasticizer MT-511*	lb.	——	.69¼
Plasticizer OLN*	lb.	.36	.42
Plasticizer SC*	lb.	.42	.46
Plasticizer W-13*	lb.	.37	.38¾
Plastoflex 3*	lb.	——	.52
52*	lb.	.37¾	.3o¾
VS*	lb.	.41¾	.42¼
Plastogen*	lb.	.08¾	.09
Plastolein 9050* (c.l.)	lb.	.54½	.56½
9055*	lb.	.30½	.32½
9058*	lb.	.48	.50
9250*	lb.	.38¼	.40¼
9715*	lb.	.39	.40
Plastone	lb.	.23	.27
Polycizer 162*	lb.	.27½	.29
332*	lb.	.42½	.44
562*	lb.	.28	.29½
662*	lb.	.28½	.30
532 and 632*	lb.	.42½	.44
ED*	lb.	——	.45
Polyco 438*	lb.	.34	.35
Polymel C-130*	lb.	.13¾	.14¼
D*	lb.	.22½	.23½
6*	lb.	.05¾	.07¼
Poly-Sperse AP-2	lb.	.23	.29½
AP-300, LC-20	lb.	.26	.32½
Poly-Sperse R-100	lb.	.17	.23½
Process Oil C-255* (c.l.)	gal.	.27½	.29½
Propylene Stearate (dms.)	lb.	——	.32
PRR 1*	gal.	.15	.35
PT 101 Pine Tar Oil* (t.c., dms.)	lb.	.0440	.0630
400 Pine Tar* (600* & 800*) (t.c., dms.)	lb.	.0440	.0630
PX-5	lb.	.21½	.22½
PX-7	lb.	.24	.25
PX-104* (dms.)	lb.	.31½	.33
PX-108* (dms.)	lb.	.29	.30½
PX-138* (dms.)	lb.	.29	.30½
PX-208* & 238* (dms.)	lb.	.42½	.43½
PX-404* (dms.)	lb.	.67½	.68½
PX-438* (dms.)	lb.	.61¼	.62¼
PX-800* (dms.)	lb.	.35¼	.36¼
PX-917* (dms.)	lb.	.35	.36
RC Plasticizer B-17* (dms.)	lb.	.23½	.24½
O-16* (dms.)	lb.	.30	.31
TG-8*&TG-9* (dms.)	lb.	.34½	.35½
TG-85* (dms.)	lb.	.36½	.37½
RC Polymeric BGA* (dms.)	lb.	.45½	.46½
Reogen*	lb.	.14¼	.14½
Resin C*	lb.	.0225	.0310
731D	lb.	.17½	.18⅜
Resinex*	lb.	.03¾	.05½
L-4*	lb.	.02¼	.04¼
Rexflex*	lb.	——	.15
Rosin Oil	gal.	.80	1.35
RR-10 (Neoprene)*	lb.	——	.37
R.S.O. Softening Oil*	lb.	.03	.05
RuBars*	lb.	.19¼	.20
Rubberol*	lb.	.18	.25¾
Santicizer B-16*	lb.	.46¾	.47¾
E-15*	lb.	.53	.54
M-17*	lb.	.44	.45
No. 140*	lb.	.35	.36
No. 141*	lb.	.36½	.37½
No. 160*	lb.	.27½	.29
No. 602*	lb.	——	.28½
No. 603*	lb.	.27	——
Sherolatum*	lb.	.03½	.06
Staflex DBES*	lb.	.58½	.61½
DOS*	lb.	.59¼	.62¼
IXA*	lb.	.32	.35
KA*	lb.	.34	.36¾
Stan Chlor Oils*	lb.	.13½	.20½
70*	lb.	.17½	.30
Stanolind Petrolatum*	lb.	.07	.156
Wax*	lb.	.31	.33
Staybelite Resin	lb.	.13¾	.15
Sunny South Burgundy Pitch*	lb.	.123	.1285
Rosin Oil*	gal.	.605	.76
Superla Wax*	lb.	.30	.397
Syncera Wax*	lb.	.16	.267
Syn Tac* (c.l.)	gal.	——	.33
Synthetic Revertant Oil	lb.	——	.16
Tar, Refined	gal.	.1200	.1760
Tarpine	lb.	.035	.050

PLASTICIZERS & SOFTENERS (Cont'd)

Terpene A*	gal.	——	.65
Tetraflex R-122*	lb.	.27	.30½
TP-90B*	lb.	.59	.69
TP-95*	lb.	.65	.75
Transphalt Resins*	lb.	.03¾	.05¾
Tributyl Phosphate	lb.	.52½	.53½
Tricresyl Phosphate	lb.	.35	.36
Triphenyl Phosphate	lb.	.41½	.43½
Turgum S*	lb.	.1560	.1660
Turgum SB*	lb.	.10½	.11½
Turpol XC-1200*	lb.	.67	.70
XC-1300*	lb.	——	.50
Vistac No. 1*	gal.	1.00	1.21
P*	lb.	.18	.18½
Vopcolene 50*	lb.	——	.31
Witcizer 100*	lb.	.26	.27
200*	lb.	.22¼	.25¼
300*	lb.	.30	.33½
312*, 313*	lb.	.28	.31½
412*	lb.	.42½	.46

PROCESSING AIDS

Castor Oil, Blown (dms.)	lb.	.25½	.26½
Refined (dms.)	lb.	——	.18½
Castorwax*	lb.	.25	.31
Dutrex 7*	lb.	.12	.20
ELA*	lb.	——	.82
Foamnix*	lb.	.60	1.50
Hydrofol Glycerides 200*	lb.	.15½	.19¾
Kenflex N*	lb.	.19	.26
Maleic Anhydride	lb.	——	.27
Millrex*	lb.	——	.15
Nadic Anhydride	lb.	——	.75
Polycin*	lb.	——	.24½
R-B-H Resin 510*	lb.	.19	.26
530*	lb.	.25	.32
STAYB*	lb.	.25	.45
Thiomalic Acid	lb.	——	3.50
Webnix*	lb.	1.25	2.00
Zyrox*	lb.	.78	.88

PROTECTIVE & STABILIZING AGENTS

Acacia*	lb.	.12¾	.21
Alcogum*	lb.	.08½	.24
Alpha Protein	lb.	——	.23
Aroostocrat*	lb.	——	.07½
Carob Bean Flour	lb.	——	.50
Casein	lb.	.22	.35
Emcol K-8300* (dms.)	lb.	.14	.18
Ethylene Diamine 68%	lb.	.44	.47
Gum Arabic	lb.	——	.23
Karaya Gum	lb.	——	.35
Locust Bean Gum	lb.	——	.50
Modicol VD*	lb.	.13⅜	.15⅞
Prosein*	lb.	——	.06
Stablex B*	lb.	.50	.95
K*	lb.	.27	.35

RECLAIMING AGENTS

Amalgamator Z-4*	lb.	.34	.35
Armeen C*	lb.	.46	.52
Mixed Crude*	lb.	.19	.25
T*	lb.	.32	.38
Blend No. 27 Oil	gal.	.35	.42
Burco RA*	lb.	.05½	.081
BWH-1*	gal.	.16	.17
C-6 Oil* (28* & 32*)	gal.	.33	.38
C-10 Oil*	gal.	.25	.30
C-33* (t.c.)	gal.	——	.21½
C-42* (t.c.)	gal.	——	.23
Caustic Soda—Flake 76% (c.l., dms.)	cwt.	——	5.20
Liquid 50% (t.c.)	cwt.	——	2.90
Solid 76% (c.l., dms.)	cwt.	——	4.80
Cresylic Acid (99-100%)	gal.	.85	1.39
D-4* (t.c.)	gal.	——	.27
E-5* (t.c.)	gal.	——	.25
Flake Calcium Chloride (77-80%)	ton	——	31.00
(94-97%)	ton	——	39.80
Gensol No. 6* (t.c.)	gal.	——	.42
Heavy Aromatic Naphtha	gal.	.13¼	.18½
LX-572 Reclaiming Oil*	gal.	.27	.32
LX-777 Reclaiming Oil*	gal.	.23	.33
Neo-Fat D-242*	lb.	.05½	.07⅓
42-70*	lb.	.08¼	.10¼
No. 517 H.B. Oil*	gal.	.11½	.16½
535*	gal.	.22	.27
Nucom* (t.c.)	gal.	——	.42
Pitt-Consol 500 (dms.)	lb.	.25	.25½
500 NS* (dms.)	lb.	.33	.33½
640 (dms.)	lb.	.42	.42
PT 101 Pine Tar Oil* (t.c., dms.)	lb.	.0440	.0630
Q Oil* (t.c.)	gal.	——	.280
Reclaiming Oil 3186-G*	gal.	.26	.33
Reclaiming Reagent No. 1431*	lb.	.21	.25
R.P.A. No. 3*	lb.	——	.51
RR-10*	lb.	——	.37
Soda Ash (c.l., bags)	cwt.	——	1.85
Solvenol No. 1	gal.	.50	.67
No. 2	gal.	.41	.62
Solvent 534*	gal.	.20½	.26½
Solvent Oil 21*	gal.	.24	.29
C-42*	gal.	.23	.38
701 Oil*	gal.	.27	.29

REINFORCING AGENTS—CARBON BLACK

Channel, Hard Processing (HPC) (bags)

Dixiedensed (and S)*	lb.	.0775	.1550
Kosmobile (and S)*	lb.	.0775	.1550

REINFORCING AGENTS—CARBON BLACK (Cont'd)

Channel, Medium Processing (MPC) (bags)

Arrow MPC*	lb.	.0850	.1625
Continental A*	lb.	.0850	.1625
Dixiedensed HR (and S-66)	lb.	.0850	.1625
Kosmobile HM (and S-66)	lb.	.0850	.1625
Micronex Standard*	lb.	.0850	.1625
Spheron 6*	lb.	.0850	.1625
Texas M*	lb.	.0850	.1625
Witco No. 1*	lb.	.0850	.1625

Channel, Easy Processing (EPC) (bags)

Collocarb*	lb.	.0710	.1485
Continental AA*	lb.	.0850	.1625
Dixiedensed 77*	lb.	.0850	.1625
Kosmobile 77*	lb.	.0850	.1625
Micronex W-6*	lb.	.0850	.1625
Spheron 9*	lb.	.0850	.1625
Texas E*	lb.	.0850	.1625
Witco No. 12*	lb.	.0850	.1625
Wyex EPC*	lb.	.0850	.1625

Channel, Conductive (CC) (bags)

Continental R-40*	lb.	.2600	.3500
Dixie 5 Dustless*	lb.	.1350	.2200
Dixie Voltex*	lb.	.2600	.3500
Kosmink Dustless*	lb.	.1350	.2200
Kosmos Voltex	lb.	.2600	.3500
Texas MC-74-BD*	lb.	.2600	.3500
Voltex*	lb.	.2600	.3500

Conductive Furnace Black (CF) (bags)

Aromex CF*	lb.	.0875	.1550
Continex CF*	lb.	.1100	.1700
Dixie CF*	lb.	.0925	.1600
Kosmos CF*	lb.	.0925	.1600
Shawinigan Acetylene Black*	lb.	——	.1900
Vulcan C*	lb.	.1100	.1850

Extra-Conductive Furnace Black (ECF) (bags)

Vulcan XC-72 (pellets)*	lb.	.2500	.3400

Furnace, Fast Extruding (FEF) (bags)

Arovel FEF*	lb.	.0675	.1350
Continex FEF*	lb.	.0675	.1350
Dixie 50*	lb.	.0675	.1350
Kosmos 50*	lb.	.0675	.1350
Philblack A*	lb.	.0675	.1350
Statex M*	lb.	.0675	.1350
Sterling SO*	lb.	.0675	.1350

Furnace, Fine (FF) (bags)

Statex B*	lb.	.0725	.1400
Sterling 99*	lb.	.0725	.1400

Furnace, General Purpose (GPF) (bags)

Arogen GPF*	lb.	.0600	.1275
Continex GPF*	lb.	.0600	.1275
Dixie 35*	lb.	.0600	.1275
Kosmos 35*	lb.	.0600	.1275
Statex G*	lb.	.0600	.1275
Sterling V*	lb.	.0600	.1275
V (Non-Staining)	lb.	.0600	.1275

Furnace, High Abrasion (HAF) (bags)

Aromex HAF*	lb.	.0775	.1450
Continex HAF*	lb.	.0775	.1450
Dixie 60*	lb.	.0775	.1450
Kosmos 60*	lb.	.0775	.1450
Philblack O*	lb.	.0775	.1450
Statex R*	lb.	.0775	.1450
Vulcan 3*	lb.	.0775	.1450

Furnace, High Modulus (HMF) (bags)

Continex HMF*	lb.	.0625	.1300
Dixie 40*	lb.	.0625	.1300
Kosmos 40*	lb.	.0625	.1300
Modulex HMF*	lb.	.0625	.1300
Statex 93*	lb.	.0625	.1300
Sterling L* and LL*	lb.	.0625	.1300

Furnace, Semi-Reinforcing (SRF) (bags)

Continex SRF*	lb.	.0575	.1250
Dixie 20*	lb.	.0575	.1250
Essex SRF*	lb.	.0575	.1250
Furnex*	lb.	.0575	.1250
Gastex*	lb.	.0625	.1350
Kosmos 20*	lb.	.0575	.1250
Pelletex* and NS*	lb.	.0575	.1250
Regal*	lb.	.0575	.1250
Shawinigan Acetylene Black*	lb.	——	.1900
Sterling NS* and S*	lb.	.0575	.1250
R*	lb.	.0625	.1350

REINFORCING AGENTS—CARBON BLACK (Cont'd)

Furnace Super Abrasion (SAF) (bags)

Aromax SAF	lb.	.1150	.1825
Dixie 85	lb.	.1150	.1750
Kosmos 85	lb.	.1150	.1900
Philblack E*	lb.	.1150	.1900
Statex 160*	lb.	.1150	.1900
Vulcan 9*	lb.	.1150	.1900

Furnace, Super Abrasion, Intermediate (ISAF) (bags)

Aromex ISAF*	lb.	.0925	.1600
Continex ISAF*	lb.	.0925	.1600
Dixie 70*	lb.	.0925	.1600
Kosmos 70*	lb.	.0925	.1600
Philblack I*	lb.	.0925	.1600
Statex 125*	lb.	.0925	.1600
Vulcan 6*	lb.	.0925	.1600

Furnace, Super Conductive (SCF) (bags)

Conductex SC*	lb.	.1150	.1800
Vulcan SC*	lb.	.1800	.2550

Thermal, Fine (FT) (bags)

P-33 (c.l.)*	lb.	—	.0625
Sterling FT (c.l.)	lb.	—	.0625

Thermal, Medium (MT) (bags)

Shellblack*(†)	lb.	—	.0250
Sterling MT (c.l.)	lb.	—	.0450
MT Non-Staining (c.l.)*	lb.	—	.0550
Thermax (c.l.)*	lb.	—	.0450
Stainless (c.l.)	lb.	—	.0550

Specialty Blacks (Awaiting Classification)

Neotex 100*	lb.	.0775	.1450
Neotex 130*	lb.	.0925	.1600
Neotex 150*	lb.	.1150	.1900
Regal 300*	lb.	.0775	.1450
Regal 600*	lb.	.0925	.1600

REINFORCING AGENTS—SILICA

Cab-o-sil*	lb.	.66	1.25
D. C. Silica (pelletized)*	lb.	1.45	1.65
Hi-Sil 233*	lb.	.08¼	.09¼
X303*	lb.	.50	.60
Santocel*	lb.	.62	.64
Ultrasil VN-3*	lb.	.35	.65
Valron Estersil*	lb.	2.00	2.25

REINFORCING AGENTS—MISCELLANEOUS

Angelo Shellac*	lb.	.40	.50
Cato 2* (100 lb. bag)	lb.	17.00	—
Darex Copolymer No. 3*	lb.	.47	.49
43G*	lb.	.39	.41
Darex Copolymer Latex No. 3-L	lb.	.41½	.46
Durez 12687 (and 12707)*	lb.	.36½	.40
Durez 13355*	lb.	.27½	.31½
Dymerex Resin	lb.	.15¾	.17
Good-rite Resin 2007*	lb.	.36	.38
2057*	lb.	.30	.31
Hystron*	lb.	.39	.41
Kralac A-EP*	lb.	.39	.41
Lampblack	lb.	—	.12
Marbon 8000*	lb.	.36	.43
Marmix*	lb.	.35	.43
Mistron Vapor*	lb.	—	.03½
HGO-55*	lb.	—	.05
Pliolite Latex 150*	lb.	.35	.37
Pliolite Resin-Rubber Masterbatches*	lb.	.33	.57
Pliolite NR*	lb.	.93	.95
S6B*	lb.	.36	.43
Plio-Tuf G85C*	lb.	.52	.54
Polyco 220*	lb.	.18¼	.19¼
Poly-Phen 201-C; 218-C	lb.	.27½	.29
202-C	lb.	.36	.37½
Polypol S-70*	lb.	.25	.26

RETARDERS

Akron Benzoic Acid TBAO-2*	lb.	.41	.43
Dutch Boy Normasal*	lb.	—	.46
ESEN*	lb.	.39	.41
Good-rite Vultrol*	lb.	.67	.70
Harcopol 1183*	lb.	.70	.74
Retarder J*	lb.	.68	.70
PD*	lb.	.39	.41
W*	lb.	—	.46
Retardex*	lb.	.46	.46
TCM-25*	lb.	.60	.70
Wiltrol P	lb.	.37	.39

RUBBER SUBSTITUTES

Mineral Rubber

Byerlyte*	ton	55.00	62.00
Hard Hydrocarbon Solid (dms.)	lb.	.03	.06
Granular (bags)	lb.	.03½	.06¼
Herron Flake*	ton	—	45.00
Mineral Rubber, Solid	ton	42.50	44.50
M. R. No. 38*	ton	57.00	70.00

RUBBER SUBSTITUTES (Cont'd)

Vulcanized Vegetable Oils

Amberex*	lb.	.29	.56
Brown	lb.	.15	.24
Car-Bel-Lite*	lb.	.33½	.36
Neophax*	lb.	.17	.27
Car-Bel-Rex A and C*	lb.	—	.126
White	lb.	.15	.21
670 Brown	lb.	.14¾	.14¾

Miscellaneous Rubber Substitutes

Gilsowax B*	lb.	.09	.11
Resin No. 1098 (dms.)	lb.	—	.62
No. 1198*	lb.	.46¾	.49¾
Tysonite*	lb.	.30	.30¾

SOLVENTS

Acetone (dlvd.)	lb.	.10½	.12
Amsco Lactol Spirits* (t.c.)	gal.	—	.20
Naphthol Spirits*	gal.	—	.19
Mineral Spirits*	gal.	—	.18
Rubber Solvent* (t.c.)	gal.	—	.19
Solv A* (t.c.)	gal.	—	.22
Solv A-80* (t.c.)	gal.	—	.23½
Solv B* (t.c)	gal.	—	.28
Solv B-90* (t.c.)	gal.	—	.31
Solv D* (t.c.)	gal.	—	.30
Solv E*	gal.	—	.30
Solv F*	gal.	—	.30
Solv F-80*	gal.	—	.32
Solv G*	gal.	—	.36
Special Naphtholite* (t.c.)	gal.	—	.19
Special Textile Spirits*	gal.	—	.20
Super Hi-Flash Naphtha*	gal.	—	.34
Super Naphtholite*	gal.	—	.19
Textile Spirits* (t.c.)	gal.	—	.20
Amyl Chlorides, Mixed (t.c.l.) (dms.)	lb.	—	.11
Benzol 90%	gal.	.36	.40
Butyl Acetate	lb.	.17	.18½
Butyl Alcohol	lb.	.17	.19½
Secondary (dlvd.)	lb.	.15	.16½
Tertiary (dlvd.)	lb.	.15	.16½
Carbon Bisulfide, Tech.	lb.	.07	.08½
Carbon Tetrachloride	lb.	.10¾	.14¼
Cosol 1*	gal.	.37	.43
2*	gal.	.42	.48
Cyclohexane	gal.	.77	110.00
85% (c.l.) (dms.)	gal.	—	.80
Cyclohexanone	lb.	.31	.34½
Diacetone, Pure (dlvd.)	lb.	.15½	.17
Dichlorethyl Ether (dms.)	lb.	.15½	.16½
Dichloropentanes (l.c.l.) (dms.)	lb.	—	.06
Dicom*	gal.	—	.55
Halowax Oil*	lb.	.28	.41
Heptanes* (t.c.)	gal.	—	.1609
Hexanes (t.c.)	gal.	—	.1584
Isobutyl Acetate	lb.	.15¼	.16¾
Isopropyl Alcohol, Ref. 99% (dlvd.)	gal.	.62	.72
Ether, Ref. (dlvd.)	lb.	.09½	.11
Mersol*	gal.	.43	.79
Mesityl Oxide (dlvd.)	lb.	.15	.16½
Methyl Acetone, Syn. (dms., dlvd.)	gal.	.66	.72
Methyl Chloride	lb.	—	.12¾
Methyl Ethyl Ketone	lb.	.15	.16½
Methyl Isobutyl Ketone (dlvd.)	lb.	.17	.18½
Methylene Chloride	lb.	—	.12½
N-5 Pentane Mix* (t.c.)	gal.	—	.13½
N-6 Hexanes* (t.c.)	gal.	—	.14½
N-7 Hexanes* (t.c.)	gal.	—	.13½
Nelio Dipentene	gal.	.41	.62
Penetrell*	gal.	.41	.42
Perchlorethylene	lb.	11¾	.15½
Petrolene* (t.c.)	gal.	—	.14125
Picolines, Alpha, Refined	lb.	.43½	.44
Mixed	lb.	.32½	.33
Proprietary Solvent (dms.)	gal.	.66	.77
Propyl Acetate (t.c., dlvd.)	lb.	—	.11¾
Alcohol (t.c., dlvd.)	lb.	—	.11
Pyridine, Refined	lb.	.69½	.70
Quinoline	lb.	.50¾	.51¼
Rubber Solvent (t.c.)	gal.	—	.16
Rubsol (t.c.)	gal.	—	.12875
Skellysolve B (Hexanes)* (t.c.)	gal.	—	.16
C (Heptanes)* (t.c.)	gal.	—	.16¼
R (Rubber Solvent)*	gal.	—	.1390
Solvent, Crude, Light	gal.	.19	.28
Solvesso 100* (t.c.)	gal.	.33	.35
150 (t.c.)	gal.	.33	—
Sunny South DD Dipentine*	gal.	.41	.62
Sunny South DD Pine Oil*	lb.	—	.15
Sunray*	gal.	.1140	.1600
Toluene (dms.)	gal.	—	.38
Toluol (t.c.)	gal.	.25	.25
Trichlorethane	lb.	—	.12¾
Trichlorethylene	lb.	.12	.16¾
Triglycol Dichloride	lb.	.63	.64
Union Thinner 1* (t.c.)	gal.	—	.174
5* (dms.)	gal.	—	.199
7* (t.c.)	gal.	—	.164
2-50 W Hi-Flash*	gal.	—	.41
Xylol (t.c.)	gal.	.29	.30

STABILIZING AGENTS (for Vinyl Resins)

Advastab BC-12*	lb.	.90	.93
BC-74*	lb.	.70	.75
BC-105*	lb.	.75	.80
CH-101*; CH-201*	lb.	.60	.65
E-82*	lb.	.90	.95
JCX*	lb.	.62	.67
L Paste*	lb.	.65	.70
SN*	lb.	.47	.52
T-10*	lb.	1.90	1.95
T-50-LT*	lb.	3.20	3.25
XBZ-155*	lb.	.69	.74
XC-143*	lb.	.90	.95
XE-98*	lb.	.53	.58
Amoca 50* 85* (bags)	lb.	11.11	11.26
Barca 10*	lb.	.65	.70
Barium Stearate	lb.	.41	.46
Basic Silicate White Lead	lb.	.16½	.17½
Cadmium Ricinoleate	lb.	—	2.00
Calcium Ricinoleate	lb.	—	.55
Dutch Boy DS-207*	lb.	—	.54
B*	lb.	—	.32½
Tribase*	lb.	—	.27½
Dythal*	lb.	—	.39½
Ferro 182* (dms.)	lb.	.70	.76
200* (dms.)	lb.	1.33	1.43
203* (dms.)	lb.	.87	.91
541* (dms.)	lb.	.35½	.45½
541A* (dms.)	lb.	.82	.86
700* (dms.)	lb.	.48¾	.58¾
900* (dms.)	lb.	.90	.94
903* (dms.)	lb.	.60	.64
909* (dms.)	lb.	.91	.95
920*	lb.	—	.98
931* (dms.)	lb.	.75¾	.85¾
993* (dms.)	lb.	.89	.99
1203* (dms.)	lb.	1.30	1.40
1206* (dms.)	lb.	1.32	1.36
1820* (dms.)	lb.	.90	.94
1825* (dms.)	lb.	1.00	1.04
1976*	lb.	.47	.51
Harshaw 1-V-3*	lb.	.43	.45
1-V-4*	lb.	.68	.70
1-V-7*	lb.	.70	.72
2-V-4*	lb.	.85	.87
2-V-8*	lb.	1.31	1.33
5-V-1*	lb.	.41	.43
6-V-1B*	lb.	—	.55
6-V-2*	lb.	—	.55
6-V-6*	lb.	—	.55
6V-10*	lb.	—	.55
7-V-2*	lb.	.93	.95
8-V-1*	lb.	.82	.84
8-V-100*	lb.	.82	.84
9-V-1*	lb.	.70	.72
12-V-5*	lb.	.73	.75
24-V-1*	lb.	1.10	1.12
128-V-5*	lb.	.86	.88
Istabelan No. 115 Liquid	lb.	.85	.95
No. 120 Liquid	lb.	.65	.75
Kosol* (50 lb. bags)	lb.	19.00	—
Lithium Stearate	lb.	.52	.57
Fluffy	lb.	.47½	.70
Standard	lb.	.52½	.75
Mark A*	lb.	2.80	3.15
C*	lb.	.81	.84
E*	lb.	.72	.75
GS*	lb.	.77	.80
LL*	lb.	.59	.62
KCB*	lb.	.59	.62
M*	lb.	.59	.62
PL*	lb.	.62	.65
TT*	lb.	.72	.75
WS*	lb.	.97	1.00
X*	lb.	2.50	2.75
XI*	lb.	.87	.90
XV*	lb.	.84	.87
XX*	lb.	.57	.60
33*; 34*; 35*	lb.	.97	1.00
Metasap 613-A*	lb.	—	.69
613-B*	lb.	—	.84
613-C*	lb.	—	1.06
621*	lb.	—	.88
624*	lb.	—	.75
633*	lb.	—	.75
635*	lb.	—	.45
Modicol N*	lb.	.42½	.44½
S*	lb.	.30⅞	.32⅞
Nonisol 100	lb.	.38	.43
Sodium Silicates 41°/1:3.2	cwt.	1.20	2.30
Stabilizer No. 52*	lb.	1.90	2.00
89X*	lb.	.75	.80
B-5*	lb.	—	.70
E6B*	lb.	—	.95
G-1*	lb.	1.25	1.40
HR*	lb.	.85	.89
L*	lb.	—	.60
OM-10*	lb.	—	1.95
Staflex OY*	lb.	1.00	1.20
QXMA*	lb.	—	.70
Stayrite 10*	lb.	.36	.41
P-10*	lb.	.43	.45
15*	lb.	.55	.57
20*	lb.	.41	.46
22*	lb.	1.00	1.13
25*	lb.	.35	.40
70*	lb.	.70	.72
71*	lb.	.90	.92
75*	lb.	.61	.63
76*	lb.	.53	.55
80*; 90*	lb.	.70	.72
95*	lb.	.70	.72
229*	lb.	.61	.63

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STABILIZING AGENTS (Cont'd)

Vanstay AC* (dms.)	lb.	.45	.48
CE* (dms.)	lb.	.44	.47
HT* (dms.)	lb.	.87	.90
HTA* (dms.)	lb.	1.02	1.05
HTB* (dms.)	lb.	.70	.73
HTC* (dms.)	lb.	1.09	1.12
HTE* (dms.)	lb.	.80	.83
HTF* (dms.)	lb.	.77	.80
L* (dms.)	lb.	.32	.35
R* (dms.)	lb.	.67	.70
RR*; RRZ* (dms.)	lb.	.59	.62
RZ-25* (dms.)	lb.	.66	.69
S* (dms.)	lb.	.57	.60
SA* (dms.)	lb.	.81	.84
Z* (dms.)	lb.	.62	.65

STIFFENING AGENTS

Polyac*	lb.	—	1.85
Processinñ Stiffener 710*	lb.	.88	.90
Solvitose HDF, H. C-S, T, and F*	lb.	.22	.25
Versatil Gum 8-E*	lb.	.15	.19

SUN CHECKING AGENTS

Allied AA-1144*	lb.	.23	.24
AA-1177*	lb.	.15½	.16½
Antisol*	lb.	—	.23
Antisun* (Chipped)	lb.	.15½	.17½
(Slabbed)	lb.	.15	.17
Heliozone*	lb.	.31	.32
Microflake*	lb.	.20	.24
Nacconol NRSF*	lb.	.40½	.45
NBC*	lb.	—	1.67
Ross Sunproofing Waxes*	lb	—	.15
Sunolite*	lb.	.16	.22
127*	lb.	.16½	.20½
154*	lb.	.23	.25
Sunproof*	lb.	.32	.33
Improved*	lb.	.25	.26
Super*	lb.	.41	.42
Jr.*	lb.	.22	.23
Tonox*	lb.	.54	.56

SURFACE ACTIVE AGENTS

Anhydrapent*	lb.	.56	.59
Anhydrol 6990*	lb.	.51	.56
6991*	lb.	.51	.56
Aquarex D*	lb.	—	.81
G*	lb.	—	.21
MDL*	lb.	—	.33
ME*	lb.	—	.82
NS*	lb.	—	.60
SMO*	lb.	—	.50
WAQ*	lb.	—	.22
Emulphor EL-620*	lb.	—	.40
EL-719*	lb.	—	.58
ON-870*	lb.	—	.55
Hyonics*	lb.	—	.28¾
Igepal CA-630	lb.	—	.29
CO-630; CO-730*	lb.	—	.29
CO-850; CO-880*	lb.	—	.29
Igepon CN-42*	lb.	—	.25
T-33*	lb.	—	.21
T-51*	lb.	—	.13½
T-77*	lb.	—	.49
Kessco 50201*	lb.	—	.44½
50203*	lb.	—	.44¾
18201*	lb.	—	.32
18203*	lb.	—	.35½
Lipal 9-N,* 11-0*	lb.	.28	.29
8-0,* 6-0*	lb.	.29	.30
25C,* 52C*	lb.	.34	.35
15T*	lb.	.23	.24
Nacconol NR (dlvd.)	lb.	.14½	.16
NRSF (dlvd.)	lb.	.40½	.45
Phosphonol 0* (dms.)	lb.	.40	.41
H* (dms.)	lb.	.80	.81
N* (dms.)	lb.	.50	.51
T* (dms.)	lb.	.60	.61
Pluronic L62*	lb.	.33½	.39
L64*	lb.	.33½	.39
Sellogen Gel*	lb.	—	.12¾
Soybean Lecithin	lb.	.13	.17
Synatol AV-60*	lb.	.28	.29

TACKIFIERS

Amalgamator Z-4*	lb.	.34	.35
Arcco 620-32B*	lb.	.20½	.21½
716-30*	lb.	.18½	.19½
1041-21*	lb.	.16½	.17½
Arcco A-2e*	lb.	.18	.19
Gunaweld Polymer No. 780*	lb.	—	.24
Galex* (dms.)	lb.	.17¼	.20
Indopol H-300*	gal.	1.00	1.22
Koresin*	lb.	1.13	1.15
Liquid Rubber Flux*	lb.	—	.14
Nacconol NRSF* (dlvd.)	lb.	.40½	.45
Nilox Resin* (c.l.)	cwt.	—	16.00
Nopco 2271*	lb.	.16¾	.18¾
OPD*	lb.	.29	.40
PR-162 Resin Emulsion	lb.	.82	—
Resin V	lb.	—	.23½
Synthol* (dms.)	lb.	.26	.30¼
Vistac A*	lb.	.21½	.22¼
Vistanex LM Grades*	lb.	—	.45
Zirex* (c.l.)	cwt.	—	15.25
82 Resin Solid (dms.)	lb.	.13½	.14½
84 Resin Solid (dms.)	lb.	.13½	.14½

THICKENERS (For Latex)

Alcogum AN-6*	lb.	.06	.06½
AN-10*	lb.	.09	.10
AN-25*	lb.	—	.31
PA-15*	lb.	.13½	.17½
PA-15-B*	lb.	.13½	.17½
Betanol* (dms.)	lb.	.70	.95
CM Starch* (100 lb. bags)	lb.	26.85	—
Gomme Labolene*	lb.	.45	.47
Good-rite K-702*	lb.	.28½	.37
K-704*	lb.	.21	.22
K-705*	lb.	.30	.39
K-707*	lb.	.18	.19
K-708*	lb.	.28	.37
K-710*	lb.	.15	.16
Hycryl A-1000* (t.l.)	lb.	.090	.100
A-2000* (t.l.)	lb.	.335	.360
Hydroseal 3* (50 lb. bags)	lb.	9.19	—
Melojel* (100 lb. bags)	lb.	6.71	—
Modicol VD*	lb.	.13⅜	.15⅞
VE*	lb.	.13⅞	.16⅜
Polyco 296 BT*	lb.	.15	.16
296-N*; 530*	lb.	.15	.16
Propylene Laurate (dms.)	lb.	.57	.82
Sodium Silicate, 41°/1:3.2	cwt.	1.20	2.30
Solvitose Series*	lb.	.22	.25

VULCANIZING AGENTS

Peroxide

Di-cup	lb.	1.10	....
T	lb.	1.10	1.50
R	lb.	1.60	2.00
40C	lb.	.55	.75
UC XK-1960*	lb.	5.50	—

Selenium

Vandex*	lb.	—	6.50
VA-7*	lb.	—	.50

Sulfur

Blackbirdd* (c.l.)	cwt.	—	2.90
Cloud* (c.l.)	cwt.	—	2.85
Crystex*	lb.	.19½	.23
Darex Dispersed Sulfur*	lb.	.14	16
Devil A* (c.l.)	cwt.	—	2.45
Dispersed Sulfur	lb.	.14	.16
Insoluble Sulfur 60*	lb.	.12½	.13
Ko-Blend IS*	lb.	—	.39
Mist* (Wettable) (c.l.)	cwt.	—	4.05
Spider* (c.l.)	cwt.	—	2.85
Star* (c.l.)	cwt.	—	4.90
Sulfasan R*	lb.	—	1.55
Tire* (c.l.)	cwt.	—	2.45
Tube* (c.l.)	cwt.	—	4.90
Vultac 2*	lb.	.47	.74
3*	lb.	.51	.78

Tellurium

Telloy*	lb.	—	5.00

WETTING AGENTS

Advawet No. 10*	lb.	—	.17
No. 33*	lb.	—	.48
Aerosol 18*	lb.	.37	.42
AY*	lb.	.75	.80
MA 80%*	lb.	.40	.45
OT 75% Aqueous*	lb.	.40	.45
OT 100%*	lb.	.75	.80
OT-B*	lb.	.65	.70

WETTING AGENTS (Cont'd)

Alrosol* (dms.)	lb.	.36	.40
Alrosperse*	lb.	—	.18
Alrowet D 65*	lb.	.31	.34
Anhydrol 6990* 6991*	lb.	.51	.56
Armacs*	lb.	.28	.77
Arquads*	lb.	.42	.61
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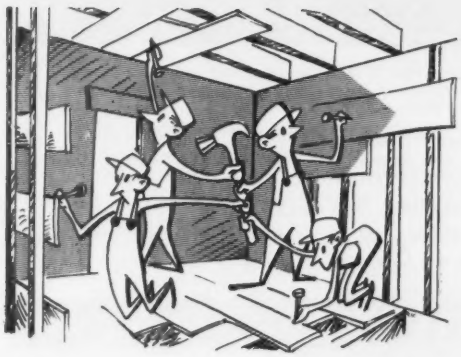

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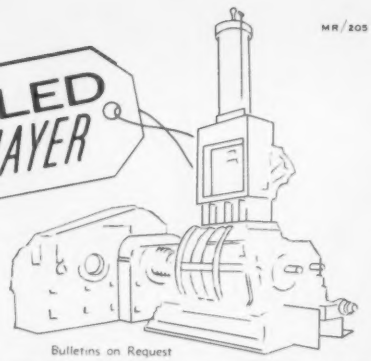

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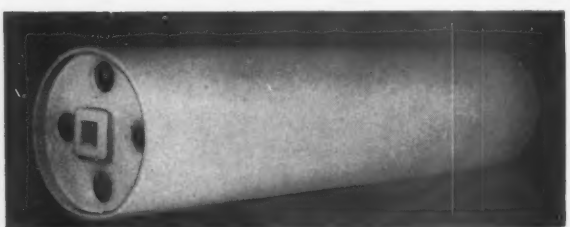

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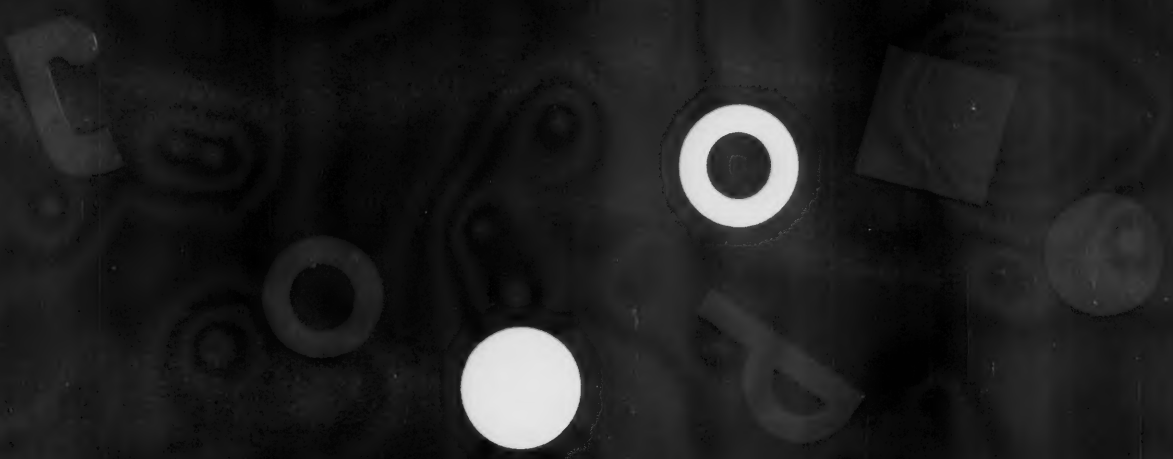

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